Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

69 B
no.25

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF PLANT INDUSTRY—BULLETIN No. 25.

B. T. GALLOWAY, *Chief of Bureau.*

MISCELLANEOUS PAPERS.

I. THE SEEDS OF RESCUE GRASS AND CHESS.
By F. H. Hillman, *Assistant, Seed Laboratory.*

II. SARAGOLLA WHEAT.
By David G. Fairchild, *Agricultural Explorer.*

III. PLANT INTRODUCTION NOTES FROM SOUTH AFRICA.
By David G. Fairchild, *Agricultural Explorer.*

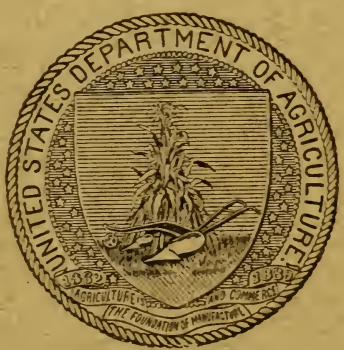
IV. CONGRESSIONAL SEED AND PLANT DISTRIBUTION CIRCULARS, 1902–1903.

BOTANICAL INVESTIGATIONS AND EXPERIMENTS

AND

SEED AND PLANT INTRODUCTION AND DISTRIBUTION.

Issued July 18, 1903.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1903

RAF
EIVED
ment of

BULLETINS OF THE BUREAU OF PLANT INDUSTRY.

The Bureau of Plant Industry, which was organized July 1, 1901, includes Vegetable Pathological and Physiological Investigations, Botanical Investigations and Experiments, Grass and Forage Plant Investigations, Pomological Investigations, and Experimental Gardens and Grounds, all of which were formerly separate Divisions, and also Seed and Plant Introduction and Distribution, the Arlington Experimental Farm, Tea Culture Investigations, and Domestic Sugar Investigations.

Beginning with the date of organization of the Bureau, the several series of bulletins of the various Divisions were discontinued, and all are now published as one series of the Bureau. A list of the Bulletins issued in the present series follows.

Attention is directed to the fact that "the serial, scientific, and technical publications of the United States Department of Agriculture are not for general distribution. All copies not required for official use are by law turned over to the Superintendent of Documents, who is empowered to sell them at cost." All applications for such publications should, therefore, be made to the Superintendent of Documents, Union Building, Washington, D. C.

No. 1. The Relation of Lime and Magnesia to Plant Growth. I. Liming of Soils from a Physiological Standpoint. II. Experimental Study of the Relation of Lime and Magnesia to Plant Growth. 1901. Price, 10 cents.

No. 2. Spermatogenesis and Fecundation of Zamia. 1901. Price, 20 cents.

No. 3. Macaroni Wheats. 1901. Price, 20 cents.

No. 4. Range Improvement in Arizona. (Cooperative Experiments with the Arizona Experiment Station.) 1902. Price, 10 cents.

No. 5. Seeds and Plants Imported Through the Section of Seed and Plant Introduction for Distribution in Cooperation with the Agricultural Experiment Stations, Inventory No. 9, Numbers 4351–5500. 1902. Price, 10 cents.

No. 6. A List of American Varieties of Peppers. 1902. Price, 10 cents.

No. 7. The Algerian Durum Wheats: A Classified List, with Descriptions. 1902. Price, 15 cents.

No. 8. A Collection of Economic and Other Fungi Prepared for Distribution. 1902. Price, 10 cents.

No. 9. The North American Species of Spartina. 1902. Price, 10 cents.

No. 10. Records of Seed Distribution and Cooperative Experiments with Grasses and Forage Plants. 1902. Price, 10 cents.

No. 11. Johnson Grass: Report of Investigations Made During the Season of 1901. 1902. Price, 10 cents.

No. 12. Stock Ranges of Northwestern California. Notes on the Grasses and Forage Plants and Range Conditions. 1902. Price, 15 cents.

No. 13. Experiments in Range Improvements in Central Texas. 1902. Price, 10 cents.

No. 14. The Decay of Timber and Methods of Preventing It. 1902. Price, 55 cents.

No. 15. Forage Conditions on the Northern Border of the Great Basin, Being a Report Upon Investigations Made During July and August, 1901, in the Region Between Winnemucca, Nevada, and Ontario, Oregon. 1902. Price, 15 cents.

No. 16. A Preliminary Study of the Germination of the Spores of Agaricus Campestris and Other Basidiomycetous Fungi. 1902. Price, 10 cents.

No. 17. Some Diseases of the Cowpea: I. The Wilt Disease of the Cowpea and Its Control. II. A Cowpea Resistant to Root Knot (Heterodera Radicicola). 1902. Price, 10 cents.

No. 18. Observations on the Mosaic Disease of Tobacco. 1902. Price, 15 cents.

No. 19. Kentucky Bluegrass Seed: Harvesting, Curing, and Cleaning. 1902. Price, 10 cents.

No. 20. Manufacture of Semolina and Macaroni. 1902. Price, 15 cents.

No. 21. List of American Varieties of Vegetables for the Years 1901 and 1902. 1903. Price, 35 cents.

[Continued on p. 3 of cover.]

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF PLANT INDUSTRY—BULLETIN No. 25.

B. T. GALLOWAY, *Chief of Bureau.*

MISCELLANEOUS PAPERS.

I. THE SEEDS OF RESCUE GRASS AND CHESS.
By F. H. Hillman, *Assistant, Seed Laboratory.*

II. SARAGOLLA WHEAT.
By David G. Fairchild, *Agricultural Explorer.*

III. PLANT INTRODUCTION NOTES FROM SOUTH AFRICA.
By David G. Fairchild, *Agricultural Explorer.*

IV. CONGRESSIONAL SEED AND PLANT DISTRIBUTION CIRCULARS, 1902–1903.

BOTANICAL INVESTIGATIONS AND EXPERIMENTS

AND

SEED AND PLANT INTRODUCTION AND DISTRIBUTION.

Issued July 18, 1903.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1903

BUREAU OF PLANT INDUSTRY.

BEVERLY T. GALLOWAY, *Chief of Bureau.*

BOTANICAL INVESTIGATIONS AND EXPERIMENTS.

FREDERICK V. COVILLE, *Botanist.*

SEED AND PLANT INTRODUCTION AND DISTRIBUTION.

A. J. PIETERS, *Botanist in Charge.*

CONTENTS.

	Page.
The seeds of rescue grass and chess	5
Saragolla wheat	9
Plant introduction notes from South Africa	13
Introduction	13
Some Cape seedling grape varieties	14
The Red Hanepoot grape	14
Vitis rupestris metallica	15
Vitis rupestris Le Roux	16
Fruit-bearing hedge plants	16
Rhodes grass	17
The Kafir plum as a shade tree	18
The Rooi-bloem, a new corn parasite	18
The Natal pineapple	20
Congressional Seed and Plant Distribution circulars, 1902–1903	23
Plan of distribution and allotments	23
Distribution of novelties and specialties	26
Directions for planting bulbs	47
Distribution of cotton seed	47
Rivers Sea Island cotton	59
Sea Island cotton No. 224	64
Iron cowpea	65
Kleinwanzleben sugar beet	68
Distribution of tobacco seed and cultural directions	70

ILLUSTRATIONS.

PLATES.

Page.

PLATE I. Mature unopened cotton bolls—Parker, Jones Improved, Moore Excelsior, King, and Seabrook Sea Island 48

II. Mature unopened and opened cotton bolls—Griffin and Allen Improved 56

III. Fig. 1.—Field infected by wilt and root-knot. Fig. 2.—Roots of Iron cowpea. Fig. 3.—Root-knot on Wonderful cowpea 64

TEXT FIGURES.

FIG. 1. Florets or seeds of rescue grass 6

2. Seeds of chess 7

3. Upright chess 7

4. Map showing districts into which the United States has been divided for seed-distribution purposes 23

5. Hyacinth, tulip, and narcissus bulbs 47

6. Row of Rivers Sea Island cotton in wilt-infected field planted with rows of ordinary Sea Island cotton 60

MISCELLANEOUS PAPERS.

B. P. I.—29. B. I. E.—52.

I.—THE SEEDS OF RESCUE GRASS AND CHESS.[a]

By F. H. Hillman, *Assistant, Seed Laboratory, Botanical Investigations and Experiments.*

There have recently been received at the Seed Laboratory from different States of the South several samples of the seed of chess, or cheat (*Bromus secalinus*), which had been offered for sale as rescue grass (*Bromus unioloides*). Notwithstanding the close botanical relationship of chess to rescue grass, and the fact that the former is sometimes, like the latter, employed as a hay crop, the difference between the two is so considerable that, if the seeds of both are to be handled in the trade, they should pass under their true names.

The brome grasses belong to the genus Bromus and vary widely in their agricultural value. One of them, the awnless brome grass (*Bromus inermis*), also called smooth and Hungarian brome grass, is highly valued in the West as a drought-resisting forage and hay plant. Rescue grass bears a somewhat similar relation to the agriculture of the South, while the chess is less valuable than either. Some value is assigned to it in certain localities, but it has been long and widely recognized as a most troublesome weed. The frequency with which it occurs in grain fields has led to the erroneous belief, adhered to by many farmers even to the present day, that chess is a degenerated form of wheat. Chess seeds are often abundant among the seeds of the cereal grains and the larger grass seeds, and sometimes occur with red clover seed.

With the aid of specimens, or descriptions, there should be no difficulty in distinguishing the seed of rescue grass from that of chess. The differences between the seed of chess and that of its near ally, *Bromus racemosus*, are more difficult to detect; but from a practical

[a] For some reason confusion has arisen in the Southern States regarding rescue grass and chess. Seed of the latter, which, though occasionally grown as a forage crop, is ordinarily a grain-field weed, has been offered for sale repeatedly under the name of the former, which is a valuable forage grass; and it has been thought desirable to issue a brief description of the two, so that both seedsmen and purchasers may be able to distinguish them. The present paper is therefore presented. It was prepared under the direction of Mr. A. J. Pieters, Botanist in Charge of the Seed Laboratory.—Frederick V. Coville, *Botanist.*

standpoint this is not so important, since the two plants are very similar in habit, and it is probable that in many localities the latter would prove quite as undesirable as chess.

Bromus unioloides (Willd.) H. B. K.

(*B. schraderi* Kunth.)

Rescue Grass. Schrader's Brome Grass. Arctic Grass.

Florets, or "seeds,"[a] 11 to 25 mm. (½ to 1 inch) long, strongly compressed from the sides, sharply keeled along the back, lanceolate as viewed from the side, the apex tapering and usually tipped by a short awn, at the base of which the glume is slightly notched; margins of the glume membranous-edged and usually not infolded except at the base; veins 4 or 5 on each side of the midnerve, or keel, evident as narrow ridges; palea two-thirds to three-fourths the length of the glume, which wholly incloses it; grain folded lengthwise and tightly clasping the infolded center of the palea. The florets are light or yellowish brown or straw-colored, often greenish and sometimes purplish. The surface varies from smooth to very finely rough-hairy, the latter condition being particularly evident on the veins and pedicel. When spread thinly on a level surface the seeds lie on one of the flattened sides. (Fig. 1.)

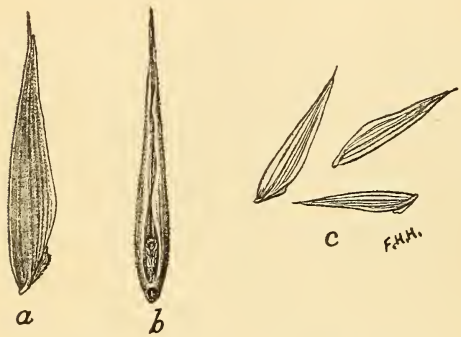


Fig. 1.—Florets, or seeds, of rescue grass (*Bromus unioloides*): *a*, side view of a seed; *b*, front view of a seed, showing the palea and pedicel between the edges of the glume; *c*, seeds, natural size.

Bromus secalinus L.

Chess. Cheat. Willard's Brome Grass.

Florets about 7 mm. (¼ to $\frac{5}{16}$ inch) long, exclusive of the awn, which varies from 1 to 3 mm. in length, not compressed, cylindrical or somewhat spindle-shaped, obtuse at the apex; glume notched at the apex above the insertion of the awn; margins more or less infolded below the middle, narrowly or scarcely membranous-edged above the middle, usually not at all flaring at the apex; veins 3 on each side of the midnerve, very indistinct; palea equal to the glume, deeply grooved conformably with the grain, the keels hispid-ciliate and partially or wholly

[a] The seeds of these grasses in a commercial sense consist of the grain inclosed in the chaff—i. e., glume and palea.

exposed; grain equal to the glume and palea, often exposed at the apex of the floret, deeply grooved, reddish brown, sometimes occurring free from the glume and palea. The florets are light or dark brown and mostly smooth, and sometimes have a slight diffused luster under the lens. (Fig. 2.)

The more evident characters by which rescue-grass seed and chess seed may be distinguished upon comparison are as follows:

Rescue-grass seeds, being strongly compressed, lie only on one side when resting on a level surface; and thus appear lance-shaped or broadly awl-shaped, tapering uniformly to a sharp, short-awned point. In contrast, the chess seeds are from little more than one-fourth to one-half as long, more robust, not evidently flattened, nearly cylindrical, grooved along one side, abruptly pointed, the apex with a very short or somewhat longer awn or awnless. When resting on a level surface they may lie slightly at one side of the midvein of the back, exposing to view the grooved face and a part of one side, or they may lie on the grooved face, showing the back. They more rarely rest directly on the back. Furthermore, the general color of a sample of chess is much darker brown than one of rescue-grass seed.

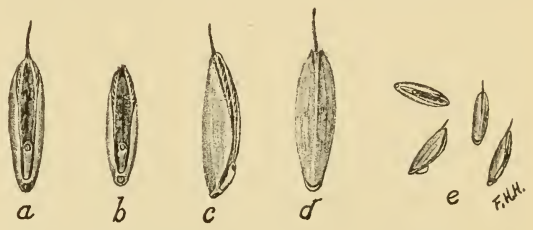


FIG. 2.—Seeds of chess (*Bromus secalinus*): *a* and *b*, front views; *c*, edge view; *d*, back view of seeds; *e*, seeds, natural size. The first three show the palea and pedicel.

Bromus racemosus L.

UPRIGHT CHESS.

Florets about 9 mm. ($\frac{1}{3}$ inch) long, exclusive of the slender awn, which varies from 4 to 9 mm. in length, similar to those of *Bromus secalinus* in general form. The glume is broader than in *B. secalinus* and usually more arched at the margins; edges sometimes membranous, especially at the apex, which is notched above the insertion of the awn and often flaring; veins sometimes distinct; palea shorter than the glume, broadly hollowed or grooved, its keels more or less exposed and hispid-ciliate; grain shorter than the palea or at least covered by it, more broadly grooved than in *Bromus secalinus*. The

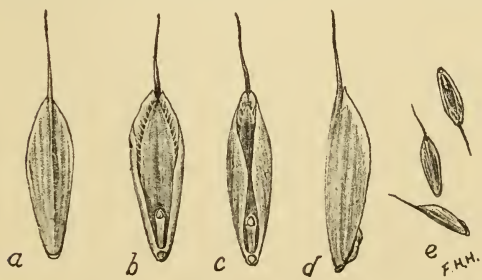


FIG. 3.—Upright chess (*Bromus racemosus*): *a*, back view; *b* and *c*, front views, and *d*, side view of seeds; *e*, seeds, natural size. Views *b* and *c* show the palea and pedicel.

florets are smooth or finely roughened and straw-colored or light brown. (Fig. 3.)

These seeds are as easily distinguished from rescue-grass seeds as are those of chess. They are most readily distinguished from chess seeds by the broader glume, longer awn, and shorter palea and grain.

The following statement of the relative values of rescue grass and chess is contributed by Mr. Carleton R. Ball, Assistant Agrostologist of the Department of Agriculture:

Rescue grass was introduced into the South some fifty years ago and has since been widely cultivated. Its chief value is for winter and early spring grazing. It is very hardy, and makes a luxuriant and rapid growth throughout the winter under favorable conditions. Although it is an annual plant, it is said to become a short-lived perennial under close grazing, which prevents the production of seed. In ordinary practice the grass is allowed to reseed itself each season. Where grazed, stock should be taken off long enough to allow seed to ripen in the early summer. If it is cut for hay in March, the aftermath will usually reseed the ground. A summer crop may be grown on the same ground if it be taken off early enough to allow the young plants to begin their growth in the fall. Rescue grass is best adapted to rich, loamy soils. On light, poor soils it is probably inferior to rye or oats for pasturage or hay.

Chess is becoming more and more common as a weed in southern wheat fields. In some parts of the country, particularly in the Northwest, it has considerable value as a hay crop. A similar value has sometimes been claimed for it in the Southern States, but the general opinion is quite the opposite. It often appears abundantly where grain crops have been killed by unfavorable conditions. There are, however, other catch crops with fewer weedy tendencies and greater forage value which may be employed in such cases. In feeding value, as indicated by chemical analyses, chess ranks lower than most grasses, including rescue grass. This has been proved to be true of it even in the Northwest, where it is so largely used for hay.

II.—SARAGOLLA WHEAT.

By David G. Fairchild, *Agricultural Explorer.*

Italy is the land of macaroni, and the best of this remarkable food product in the world is to be had in Naples. There seems to be an agreeable flavor about Neapolitan macaroni which is characteristic of it and which one does not find in the French or Spanish, or even in the north Italian made product. Macaroni a la Napolitona, with its sauce made from the plum-like tomatoes that one sees hung up to dry everywhere on the walls of the narrow streets of Naples, must be tasted within sight of Vesuvius before one can judge this national Italian dish.

In searching for a reason for this superiority of the Neapolitan macaroni, the writer's attention was called to the fact that an especially fine-flavored variety is made from a native wheat called Saragolla, and that this variety is made only in small quantities. Paradoxical as it may seem to the American who is ready to pay any price for the best food products, the very finest quality of Italian macaroni is not often exported to America. This is a statement which the writer feels warranted in making after interviewing some of the largest exporters of macaroni, as well as the famous producers of Gragnano and Torre Annunziata. The reason for this anomalous condition of the trade lies in the fact that the very finest kind of macaroni keeps only a few months, while the commonly exported article remains good for a year.

In the days before the macaroni trade had assumed the proportions that it now occupies in the commerce of Italy it was supposed that only the hard wheats of Apulia and Sicily could be used in its manufacture, but as the demand for this foodstuff increased the hard wheats of other countries were imported. Among these wheats those from southern Russia, the so-called Taganrog varieties, proved best suited to the demands of the manufacturer. They are now imported in large quantities every year, and the majority of the macaroni is said to be made from these imported wheats. Nevertheless the manufacturers still consider the durum wheat of the province of Apulia to have a flavor superior to the imported varieties, and they place the so-called Saragolla wheat at the head of all macaroni wheats so far as the production of a fine-flavored product is concerned.

The market price of the Saragolla wheat ranges from 1.25 to 1.75 lire per quintal higher than that charged for the best Taganrog sorts, even after a duty of 8 lire per quintal has been paid; and the reason for this higher price is not so much in the better flavor of the Italian wheat as in the greater yield of semola per given weight of grain. The semola makers get proportionately more salable product out of the Saragolla wheats than they do out of those from Taganrog or other sources of import.

It is from these south Italian wheats that the most delicate macaroni of Naples is made, and the connoisseur who wants to live well in southern Italy insists on having his macaroni made from the hard wheats of Apulia. It makes little difference to him that the more delicate variety does not keep so well and more quickly falls a prey to the attacks of insects. What he wants is the fine flavor.

Like the export Munich beer, or the canned Danish butter, macaroni designed for sale in America, it is said, must be especially prepared, and the tougher gluten of the Taganrog wheat renders the macaroni that is made from it better suited for the export trade. Mixtures of the imported and the Saragolla wheat are also often made, it is said.

The region south of Foggia near the Adriatic coast of southern Italy, where this best Italian macaroni wheat is grown, is one of the driest in the country, having an annual rainfall of only 446.7 mm., or about 17.59 inches. In this respect it is but little superior to some of the Russian wheat regions, which have, according to Carleton, about 15 inches.

Whether or not the generally acknowledged superiority of Italian macaroni, even that made from Taganrog wheat, is due to the water used in its manufacture is a question which would probably require much study to answer. It is difficult to understand how any bacteria present in the water used to make the paste can influence the flavor, for it is employed while boiling hot. There is a possibility, however, that in the cellaring process, or the preliminary drying in the open air, the freshly made macaroni may be affected by the bacteria with which the air of the moist cellars and exposed drying places must be filled.

Although perhaps superfluous to the American manufacturer of macaroni, a description of the process of making it as followed in Gragnano and Torre Annunziata may have some interest as being that pursued by some of the most famous factories in the world.

To travelers in Italy these towns are pointed out as nestling at the base of Vesuvius and forming scarcely more than suburbs to the big city of Naples. They are dependent upon the manufacture of the pastas, as the various types of macaroni are called, and hand-worked mills stand side by side with those run by steam; all squeezing out long strings of yellow paste, which are cut and hung up on poles to

dry. The housetops, courtyards, narrow streets, and hillsides are covered with thousands of reed poles bending under the weight of yellow macaroni, and scattered over the ground on mats lie different sorts of short-shaped pastas.

The process of manufacture seems exceedingly simple, but there may, for all that, be secrets of the trade. As described in general by the manager of a large mill in Torre Annunziata the mode followed by the steam factories is as follows:

The durum wheat is ground into semola and sieved to remove the starchy part of the grains and leave the clear, light amber, or glutinous part. Three or four grades of quality are made, and these depend on the size of the sieve meshes.

The semola is put into a special iron mixer, shaped like an old-fashioned artillery mortar, except that it is square instead of cylindrical, and furnished in the bottom with special screw-shaped fans with which to stir the paste or dough. Boiling water is added to the semola and the dough is mixed for about seven minutes. The mass is then put on a flat, circular kneading board and kneaded by two sharp-edged parallel beams, which rise and fall as the table turns and press into the dough as they descend. A few minutes of kneading are sufficient and the homogeneous dough is then put into the cylinder and the piston descends upon the mass, forcing it in strings slowly through the perforated plate at the bottom. Fifteen minutes are required to convert the gallons of dough into thousands of feet of yellow macaroni. The yellow color is produced by the use of saffron, of which powder a very small quantity is put into each batch of dough.

As soon as the strings of fresh paste which issue continually from the die are of the proper length they are cut and thrown over a reed pole and carried into the sunlight, if the weather is fair, or into sheltered terraces, protected by curtains from the rain, if the weather is unfavorable. On bright days the strings of macaroni are exposed to the sunlight only two hours. They must be dried out only slightly before being cellared for the night in dungeon-like underground vaults similar to the Bavarian beer cellars.

For twelve hours or more the poles of macaroni are kept in these damp places, until the dough has become moist and pliable again and the strings have lost the brittleness that the exposure to the sunlight has given them. From the cellars the poles are carried to shaded storehouses, open on all sides to the air but not lighted from above. Here, in great masses of millions of strings, they hang for several days—from eight to twenty being required, depending upon the dryness of the atmosphere. According to the statements of the manager of a factory this process of drying is necessary to give to the brittle paste a horn-like toughness and fit it to withstand the rough handling to which it will be subjected without breaking into small pieces.

In all this simple process the one point at which bacteria might have a chance to play a rôle is in the first drying, cellaring, and subsequent slow drying in the shade. The theory that the water is responsible for the flavor must rest, it seems to the writer, on other than bacterial grounds, for from the appearance of the tank which supplied the hot water the inference is easy that the water is chalybeate, for the tank was incrusted with lime.

If, aside from the superiority of the macaroni of Gragnano, which is made from Taganrog wheat, a specially fine flavor is produced by the use of Saragolla grain, the growers of durum wheats in America deserve to have their attention called to this variety and be given an opportunity to test it on a reasonably large scale. The thin-skinned nature of the sort and its consequent greater semola-producing properties may not be maintained in all places in America, but regions may be found where these valuable qualities as well as the flavor are retained, and the wheat may prove, as it evidently does in Apulia, a profitable crop.

NAPLES, *November 9, 1902.*

III.—PLANT INTRODUCTION NOTES FROM SOUTH AFRICA.[a]

By David G. Fairchild, *Agricultural Explorer.*

INTRODUCTION.

From the standpoint of an agricultural explorer South Africa is a land of newly introduced plants. Compared with old civilized countries like Egypt and Japan, it is poor in cultivated species that are suitable for introduction into America. Its native flora is rich, but the number of economic plants is small and the most important of these have been brought into Africa in comparatively recent times. Only one who has been bewildered by the hosts of cultivated native plants of the Malay Archipelago can fully realize the dearth of food plants of South Africa. The explanation is simple. The Kafirs and Hottentots were, like our American Indians, races of hunters, and lived mostly on the immense herds of game which roamed over the vast areas of grass land on the South African veldt. As these herds of antelope and other game diminished in numbers or disappeared the natives became stock raisers and counted their wealth by the number of cattle they owned. The cultivation of the soil, which in such lands as Java or Japan was the chief occupation of the people, played a small rôle among the blacks of Cape Colony, and in consequence few wild plants were brought into cultivation, and the staple food plants of other races, when introduced late in the history of the country, were accepted by the Kafirs and grown in a careless, slovenly manner. The mealies of the country are the maize plants from America. Cassava is the West Indian manihot. Kafir corn is the "Dura" of the Arabs.

[a] Several South African wild plants have already found their way into cultivation as valuable ornamentals, but, as Mr. Fairchild has pointed out in the present Bulletin, the South African flora is poor in economic species. There are some, however, that may prove valuable additions to the forage resources of our Southwest, and the grapes and the pineapples described will certainly be worth a careful trial.

The plants and seeds sent through the kindness of Mr. Lathrop have been distributed in such a manner that we shall be able to watch the growth of these plants in the United States.—A. J. Pieters, *Botanist in Charge of Seed and Plant Introduction and Distribution, Washington, D. C., May 8, 1903.*

and rice and potatoes were practically unknown among their cultivated plants.

It is no wonder that a country in which the natives have neglected their indigenous fruits and grains, and in whose footsteps the early white settlers followed, should prove a land poor in cultivated plants that are worthy of introduction into the New World.

A few things have, however, been called to the writer's attention during a stay of some weeks in the country, and these have seemed worthy of writing about for the information of American cultivators.

SOME CAPE SEEDLING GRAPE VARIETIES.

It were strange if in so old and isolated a vine region as South Africa seedling varieties of the grape had not originated.

Mr. Eustace Pillans, at present in charge of the Government Wine Farm at Constantia, has called the writer's attention to three varieties which are either known to be Cape seedlings or are of doubtful Cape origin, and the department of agriculture of the colony has, with that liberality which characterizes it, offered to send in July next a quantity of cuttings of each to America.

THE RED HANEPOOT GRAPE.

The Red Hanepoot, which ranks as one of the best export table grapes from South Africa, and which is called by the late Mr. De Waal, vine expert of the Cape government, the Red Muscat of Alexandria, is described as a variety with large, loose bunches, a large oval berry, which is dark red when ripe and has a sweet and musky flavor. It requires a lime and clay subsoil, and its fruit ripens in the middle of the grape season.

The origin of the Red Hanepoot, I am told, is not known, but it is believed to be a seedling of the White Muscat, called at the Cape White Hanepoot, and Mr. Bioletti, wine expert at the Elsenburg Agricultural School, who was formerly connected with the California Experiment Station, assures me that it is probably of Cape origin, and so far as he knows is not grown anywhere in California. Its good shipping qualities and its excellence as a table grape will, Mr. Bioletti thinks, give it a place beside the Flame Tokay, from which it differs in its decided musky flavor. Its excellent eating qualities Mr. Lathrop and the writer had an opportunity of testing, and there can be no doubt of its desirability for Californian vineyards. Like the other Muscat varieties, it is difficult to graft successfully upon resistant American stocks, and at the Cape it has succeeded best upon a seedling variety of *Vitis rupestris* called "*Le Roux*," which is likewise of South African origin.

VITIS RUPESTRIS METALLICA.

Vitis rupestris metallica is the name given by the late Mr. De Waal to a resistant stock grown from American seed on the Government Wine Farm at Constantia. This is quite distinct, Mr. Bioletti says, from a French variety bearing the same name, and is another of the Cape productions which is worthy of the attention of California vineyardists. It was a chance seedling, like the Riparia Gloire de Montpellier stock so universally used, according to De Waal, in the Medoc vine region of France. In the Agricultural Journal for December, 1901, Mr. De Waal published the following statement in reference to the origin of this interesting variety, which is, according to Mr. Pillans, taking the lead all over the colony as a grafting stock for wine grapes:

RUPESTRIS METALLICA.

This variety is derived from one seedling stock selected at Groot Constantia from amongst thousands. It was picked out in the year 1894, and new stocks were multiplied as fast as possible by the single-bud or one-eye system of propagation. In 1896 a mother plantation of 3,500 vines was laid out. The combined plantations have this year (1901) given a return of 687,000 cuttings, exclusive of several cartloads of thin ends. As many other mother plantations of this variety have, during the past few years, been laid out in the Constantia and other districts, the old mother stock, selected in 1894, must this year have given rise to an output of several millions of cuttings. The Rupestris Metallica is a strong grower and will thrive well in any loose soil, loam, gravel, or sand, and also in dry, open, heavy soils; it can besides stand a fair amount of wet in loose soils. It forms an excellent graft bearer for all varieties of European vines, except the Hanepoot, and, possibly also, other members of the Muscat family. A large percentage of Hanepoot grafts will die back on it even after a very successful start, and as a stock for Muscat Hambourg its suitability is also doubted. It appears to answer fairly well as a graft bearer for Muscadel, but sufficient experience on this point has not yet been gained to recommend it unreservedly as a stock for that variety.

The latest verdict regarding this Metallica stock from Mr. C. Mayer, who has not been an enthusiastic believer in it, is that it is suitable for dry, light sandy soils, but not for heavy ones. It is remarkable for the ease with which the cuttings root and can be grafted upon. The proportion of failures among grafts upon this stock is said to be remarkably small, and when millions of grafts are concerned this item is an important one.

The vigorous nature of the Metallica is claimed by Mr. Pillans to impart to the graft a very remarkable productiveness, and certainly when compared at Groot Constantia with the same varieties grafted on other American stalks of French origin, the load of fruit on the metallica vines this season bore out Mr. Pillans's belief. Considered from the standpoint, then, of a quick-rooting, easy-grafting, vigorous stock, which produces good bearing vines, the *Vitis rupestris metallica* is well worth an extensive trial in California.

VITIS RUPESTRIS LE ROUX.

The Muscat varieties of table grapes, which are among the best, do not generally thrive well when grafted on American phylloxera-resistant stocks, and vineyardists in California are, according to Mr. Bioletti, looking for a better variety of stock than those already in use.

In Cape Colony, two of the best table grapes, the White and Red Hanepoot sorts, are of the Muscat type, and in replanting the vineyards with resistant stocks, the ordinary Riparia and Rupestris varieties have proven uncongenial to these Muscat kinds.

In March, 1899, the Cape department of agriculture appointed a commission to investigate the causes of this failure of the Hanepoot grafts on American vines.

In their printed report members of this commission call attention to the Le Roux, a seedling variety of American parentage which originated in the Cape and which has proved a successful stock for the Hanepoot variety of Muscat grape, of which there are six-year-old plants growing in the colony.

This Le Roux grape is named after Mr. Le Roux, of Drakenstein, upon whose place the seedling was raised and first propagated. Such a stock which, although not yet thoroughly tested, promises to be well suited for Muscat varieties, deserves the attention of our vine growers.

FRUIT-BEARING HEDGE PLANTS.

The finest hedges in Natal are the evergreen amatungulas, which are made from the white-flowered, red-fruited *Carissa grandiflora*, a native of the colony. It is rare to find a fruit-bearing hedge, and of all those which the writer has seen the amatungulas are the most desirable. The genus *Carissa* contains a number of thorny, evergreen shrubs which bear pretty white flowers and edible red fruit.

On the markets in Durban the long, brilliant red fruit of the amatungulas is commonly sold; in fact, during January and February it is one of the commonest fruits to be seen in the stalls. Though variable in size and shape, it has generally an elongated form, with a distinct point, and the diameter of a good-sized Damson plum. The thin, red skin covers a pink flesh with a milky juice, which in flavor is sweet but lacks character, although much praised by European residents for use in making fruit salads.

To make an amatungula hedge, Mr. I. Medley Wood, the curator of the Durban botanic gardens, informs me, is a very simple matter. The seeds are sown in a seed bed, and when the young plants are 6 inches high they are transplanted to the place chosen for the hedge and set a foot apart, alternately in parallel rows, distant from one another a foot or more. As the plants grow they are trimmed into the desired hedge form, and the oftener they are trimmed the thicker

they interweave their tough, thorny branches, making an impenetrable barrier for stock of all kinds. When in flower the white, jasmine-like blossoms show off strikingly against the dark background of foliage; and the red fruit which follows is quite as pretty. It is an interesting sight to see the children hunting up and down the hedges about the city houses for the ripe amatungulas, with which they fill their aprons.

A nearly related species of Carissa (*C. arduina* DC.) is one of the prettiest shrubs in the municipal gardens in Cape Town. Its symmetrical form and dark-green leaves and branches make it well worth a place on the lawn of any subtropical park, while its pendant red fruits, which look like large barberries, make a showy contrast to the dark background. These fruits, like the amatungulas, are filled with a milky-juiced flesh, and are not unpleasant to the taste, although they have no sprightliness of flavor.

Whether or not the genus has in it sufficient material from which, by breeding, a new superlative fruit plant can be produced, which at the same time will make good hedges, is a question for experiment.

RHODES GRASS.

At Groot Schur, Mr. Cecil Rhodes's estate, near Cape Town, there are several large grass fields of a species of chloris (*C. virgata* Sw.) grown from seed which Mr. Rhodes had collected in the eastern provinces of Cape Colony some years ago. Although, according to Professor MacOwan, the plant occurs commonly in the subtropical zone in other continents, from the fact that it was first brought into culture in South Africa by so noted a man as Mr. Rhodes it has been given the name of Rhodes grass.

Like other species of the same genus, this one sends out long, creeping stems, which lie flat on the ground, and from these the finger-like inflorescences arise. These stems lying on the ground are tough and hard and are likely to be of little food value, but the mass of leaves which is produced above them on good soil attains, it is said, a foot or more in height and has excellent feeding properties.

It does not seem likely that this species will prove more resistant to drought than many other grasses, for on the slopes of Table Mountain a patch was pointed out which was evidently not a success, and the only explanation for the failure was that the ground there was too dry. However, the planters to whom the steward of the estate has distributed seed have found the grass a valuable fodder plant, and there is such a local demand for the seed that a single sack was all that could be secured for trial in America. This quantity was given after application to the Chartered South African Company and to the steward of Groot Schur.

THE KAFIR PLUM AS A SHADE TREE.

Professor MacOwan, whose writings on South African plants are so well known, showed the writer a row of Kafir plum trees which, by his advice, were planted in the grounds of the Parliament building at Cape Town. He pointed out that, owing to the situation of the adjoining houses, they were subjected to the most violent cross winds, and that ordinary trees which had been tried there were unable to keep their shape. A "southeaster" which came up before leaving Cape Town permitted the writer to see how these trees were whipped and beaten about with the winds from Table Mountain. It is truly remarkable how well they bear the rough treatment.

The evergreen foliage of this interesting tree is dense and dark, and casts a deep shade, which in sunny climates is always a desirable character. Its gray trunk and upright branches produce a graceful vase form, while its bright red plum-like fruits show off in pretty contrast against the dark background of leaves.

These plums are nearly all seed, only a thin layer of subacid pulp lying between the stone and the thin red skin, and though they are of sufficient sweetness to be attractive to children, they would find no use in our American households.

The species is a tender one and could only succeed in the frostless regions of the country, but its characters as a shade or avenue tree should win for it a place among the ornamentals of the subtropical zone.

According to the conservator of forests of Cape Colony, Mr. D. E. Hutchins, the Kafir plum is a large timber tree of the eastern provinces and produces a useful wood that is almost indistinguishable from mahogany, and which, like the latter, requires careful seasoning.

THE ROOI-BLOEM, A NEW CORN PARASITE.

Plant introduction concerns itself with calling to public notice plants which should not be introduced as well as those that are eligible for cultivation.

Professor MacOwan handed the writer the letters which are here reproduced, and which call attention in a forcible way to a parasite of the Indian corn plant which might prove a great pest if once introduced into our corn belt.

The plant has caused damage among the mealies (Indian corn) in Natal, and the Government entomologist, Mr. Fuller, has published in his reports notices of its ravages. While it appears to cause the most injury in poorly cultivated ground, and, in the opinion of Mr. Fuller, requires only clean culture to get rid of it, it is no doubt a pest that American corn growers should beware of introducing. The danger of its introduction seems quite remote, since no grain is imported from South Africa to America, but still it would be well to guard against any chance of its being introduced.

TRANSVAAL DEPARTMENT OF AGRICULTURE,
GOVERNMENT BUILDINGS,
Pretoria, February 24, 1903.

SIR: I am sending you per same post a box containing a weed forwarded to me for identification. As we are at present without a botanist, I trust you will kindly help me in the matter. * * * For your fuller information I inclose the letter which accompanied the specimen.

I have the honor to be, sir, your obedient servant,

R. A. DAVIS.

Professor MACOWAN, *Cape Town.*

[Inclosure.]

SANDBACH, AMSTERDAM P. O., *February 15, 1903.*

SIR: I am sending you by this post a box containing a weed which is very prevalent on this farm. The Dutch call it "*Rooi-bloem.*" When it appears among mealies it immediately kills the mealies. I have a field of over 40 acres which had a first-class crop of mealies three weeks ago; since then this "*Rooi-bloem*" has appeared, and I am doubtful if I shall get five bags off the whole field. The Dutch say there is no cure for it, and nothing can be done to eradicate it; but I can not find out whether anything has been tried. Will you be good enough to inquire if any known cure exists? It is said that "*Rooi-bloem*" only affects mealies. I have been trying to get oats for sowing in April, but can not get any "Africander" oats.

Yours, faithfully,

G. S. LESLIE.

SECRETARY LAND BOARD, *Pretoria.*

CAPE GOVERNMENT HERBARIUM,
Cape Town, February 28, 1903.

MY DEAR SIR: I am in receipt of your letter of the 24th instant respecting a weed doing mischief in mealie crops, and of the sample belonging thereto.

The plant is a semiparasite, *Striga coccinea* Bth., and is not infrequent on our eastern frontier. Its habits resemble those of *Rhinanthus crista-galli* L., the "*yellow rattle,*" and *Melampyrum pratense* L., in that it is able to live easily on its own roots like other normal plants, but also to attach itself to those of more succulent neighbors and draw surreptitiously upon their food material. It will work when it must, but prefers the easier life of a predatory parasitism.

As to extirpation of this showy interloper, advise your correspondent to give up for the present the culture of cereals upon the acreage infested with *Striga*, so that the parasite shall find no host to receive it, and perseveringly plow and cross plow, following with the harrow to get the weeds into heaps for drying and burning. A crop of totally different character, such as lucerne, for instance, would be best. But if local conditions do not allow of this, a double cropping with rape, to be grown on till fit for stock food, fed off, and then turned in to make way for the second crop suggests itself. The object is to give no chance to the *Striga* to renew its parasitism. The seed of the *Striga* is small and tenacious of life, hence the repeated working of the soil is important. Also it would be well to use kraal manure in place of stable dung. It is astonishing what a number of weed seeds pass through the intestinal tract of the horse, and since we very rarely keep his contribution to the fertility of the farm long enough to insure their being killed out by a proper rotting down, we innocently sow a crop of weeds along with the manure. This is the secret of the spread of "zuuring" far and wide.

Will you hereafter let me know what is decided on and what the results amount to? I will consult our recently arrived agricultural assistant, and will let you know sharp whether he has anything different to recommend.

Remaining, my dear sir, yours, faithfully,

P. MacOwan.

R. A. Davis, Esq., *Pretoria.*

THE NATAL PINEAPPLE.

The common pineapple of Natal, which is served everywhere in the colony on private and hotel tables, is one of the most satisfactory varieties of this fruit in the world.

Mr. Lathrop, who has traveled for many years in pineapple-growing countries, found the Natal pine one of the most delicious and in certain respects the most satisfactory of any which he had ever eaten.

This variety is a small one, the fruit often not being over 6 inches long, but this is one of its desirable characters. It is just large enough to serve as an individual fruit at a dinner table, and the result is that in Natal one is given a whole pineapple and prepares it himself, instead of a slice from a fruit that has been prepared in the kitchen and in which fermentation has already set in.

The form of this fruit is in all ways satisfactory. It has a small cluster of leaves at the apex, just large enough to serve as a good handle when you are preparing it for eating. The seed cavities are small and do not enter a great distance into the fruit. The skin is thin and easily cut off with a sharp knife. The flesh, which has a golden-yellow color when ripe, is so crisp and brittle that you can break it away from the slender core with a fork almost as easily as you could tear an apple to pieces. Many pines having a deliciously flavored flesh are so tough and full of fiber that it is only with difficulty that portions can be separated from the core for eating. This character of tender, fiberless flesh is possessed by the Natal pine to a very marked degree, and especially recommends it to people whose delicate digestion prohibits their eating the ordinary sorts, which contain more or less fibrous matter.

As regards flavor this variety leaves little to be desired. It has the characteristic pineapple taste, is deliciously sweet, and compares in these characters very favorably with the best hothouse pines. It may not be quite so juicy as the latter, but this character can scarcely be considered an objection to it.

No pine that has come to our attention has so little core to it as this Natal sort. Some fruits have scarcely any core, the pencil-thick center part itself being tender enough to eat, and as a rule the core spindle which one discards in eating is not over a half inch in diameter.

According to those with whom the writer talked the origin of this Natal pine is not known, though it has been in cultivation many years in the colony. Some time ago the Government, under the impression

that foreign varieties were better than their own, introduced suckers of the Ceylon and other larger fruited sorts for trial. These introductions have produced no effect upon the cultivation of this native sort, I am informed, and the "common pine" is still the great market variety of South Africa.

This Natal variety is so remarkable that suckers for introduction into America would have been secured had not many of the fruits seen in the markets and on the hotel tables been affected with what appears to be a disease; and although the contagious character of this malady or even its determination as of fungus or bacterial origin could not be decided, it was deemed best to take no chances of introducing it into our pineapple plantations.

The fruits affected by this disease have generally soft spots on them near the base, which, when cut into, are found to reach some distance into the flesh. The small cavities characteristic of the outer part of the pine are in these affected areas of a peculiar white color. This appearance resembles somewhat that produced by a felt of very fine fungous mycelium, but with a high-power hand lens no mycelial filaments could be detected. The same white color is also often produced in fruit flesh by the drying out of the juicy cells, and I am inclined to think that empty air-filled cells are the cause of the snowy-white appearance in this case. The flesh about the diseased areas is soft and juicy, but in none of the fruits examined was there any dark discoloration such as characterizes the pineapple disease described from Queensland and which is reported to be caused by the conidial, Fusarium-like form of some Ascomycete. This Natal malady does not agree with the description of the Queensland disease, and, if it proves to be a fungous disease at all, will probably be found to be caused by some new species of fungus.

A pine which is probably identical with this Natal variety is grown extensively in the eastern provinces of Cape Colony. It is there cultivated on the hillsides at a considerable altitude and not on the level plains, and it is grown in such quantities that the markets everywhere are overstocked with it. Pineapples are the cheapest fruit in South Africa.

Some of these eastern province pineapples were sent for by the Cape department of agriculture in order that we might compare them with the Natal variety. These, although not quite so luscious as those eaten in Natal, were evidently the same sort, and the very slight inferiority in flavor might be easily explained by the fact that the eastern-province fruits were picked before becoming quite ripe in order to ship well, while the Natal ones came more directly from the fields.

Through the department of agriculture a number of suckers of this eastern-province pineapple were ordered after it was ascertained that

the disease which affected the Natal fruits was unknown there. These were to be sent from perfectly healthy plantations[a] and are unquestionably safe for introduction; but in order to make doubly sure of not introducing any pernicious pests, the introduced suckers will be grown apart from the commercial plantations and carefully watched.

[a]According to Mr. Malley, the Assistant Cape Entomologist, there are, in the eastern provinces, plantations in which pines do not grow well and some situations where pineapple growing has had to be abandoned. Whether any specific disease is the cause of this or not is a disputed question. A careful examination on his part failed to reveal any cause, and it seems most likely that unsuitable physical conditions will account for the failure of the fruit in these situations.

IV. CONGRESSIONAL SEED AND PLANT DISTRIBUTION CIRCULARS, 1902–1903.[a]

[Circular sent to Senators, Members, and Delegates in Congress.]

PLAN OF DISTRIBUTION AND ALLOTMENTS OF CONGRESSIONAL SEEDS AND PLANTS, 1902–1903.

Some changes in the plan of conducting the Congressional distribution of seeds, plants, bulbs, etc., during the fiscal year 1902–1903 have been approved by the Honorable Secretary of Agriculture, and in order to aid you in preparing addressed franks your attention is respectfully called to the changes set forth below.

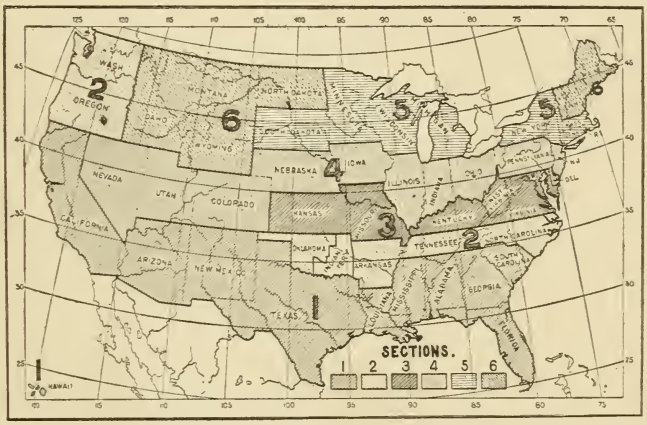


FIG. 4.—Map showing the districts into which the United States has been divided for seed distribution purposes.

Division of the country.—With a view of handling the seed to better advantage the country has been divided into six districts, and varieties of seeds and plants particularly adapted to each district will

[a] This publication consists of a number of circulars prepared by different members of the scientific force of the Bureau of Plant Industry and one prepared by the Chief of the Bureau of Soils. These circulars were originally printed to accompany the seeds sent out through the Congressional distribution and consist of descriptions of varieties and directions for their culture. Many of these contain matter that should form part of the permanent records of the Department, and they have therefore been collected for publication in this form.—A. J. PIETERS, *Botanist in Charge of Seed and Plant Introduction and Distribution, Washington, D. C., May 12, 1903.*

be distributed therein. The accompanying small map shows the manner in which the divisions have been made.

Vegetable seeds.—There will be, as usual, a distribution of miscellaneous vegetable seeds, and in addition it is planned to furnish a limited number of packages of novelties—that is, seeds of varieties either new or little known and of peculiar merit for distribution in each locality. The miscellaneous vegetable seeds will be put up as usual, 5 packets in a package, and each Senator, Member, and Delegate in Congress will have 12,000 such packages to his credit. There will be 500 packages containing the novelties, each package containing 5 packets. The novelties will be accompanied by a circular describing the varieties in full and giving directions for culture and use. There will also be a franked postal card for each collection of the novelties, so that the recipient may, if he desires, signify his willingness to make a report to the Department on the seeds received.

Flower seeds.—The number of packages of flower seeds allotted to each Senator, Member, and Delegate in Congress has been increased to 500, and arrangements have been made whereby members having city constituents may exchange vegetable seeds for flower seeds, if they so desire. Details of this arrangement will be furnished later. A special collection of flower seeds will be prepared for those having strictly city constituents, the varieties chosen being suitable for window boxes, lots, and small dooryards.

Cotton and tobacco.—The plan adopted last year of putting up special collections of cotton and tobacco best adapted to the districts into which they are sent will be continued. This work has proved very satisfactory, as through it many valuable varieties have been distributed.

Grass seed and forage crops.—Plans for the distribution of these seeds have not yet been fully matured, and a later announcement will therefore be sent out as soon as complete arrangements are perfected.

Plants, trees, and grapevines.—The distribution of plants, trees, and grapevines will be similar to that of last year, excepting that the number of trees will be increased to 100 for each Senator, Member, and Delegate. Full information as to the character of the trees, plants, etc., will be forwarded later.

Bulbs.—These will be ready for distribution early in November, and they should be distributed promptly in order to secure the best results. Due notice will be forwarded when the bulbs are received.

Loose packets of vegetable seed.—In order to enable Senators, Members, and Delegates to quickly meet small miscellaneous demands for vegetable seed, loose packets of the assortments put up for general distribution will be sent to committee rooms, or elsewhere in Washington, upon receipt of proper orders. Envelopes for forwarding these packets through the mails will also be furnished. This plan will make it practicable to send out packages containing more than five

packets, if it is desired to do so. In no case, however, can the Department put up such packets, as the large number of packages to be distributed makes it necessary to use uniform numbers.

Franks.—The present session of Congress authorized the Public Printer to furnish the Secretary of Agriculture with the franks of Senators and Members necessary for sending out the seeds. Arrangements have therefore been made for securing franks with the facsimile signatures of Senators and Members, together with their respective States, printed thereon. These franks will be furnished at once, in sufficient quantity for vegetable and flower seeds, upon request made to the Secretary of Agriculture. With this arrangement there will be no necessity for using document slips, and all of those made for the seed work will be of uniform size and style.

Southern distribution.—It is planned to make the distribution in sections 1 and 2 at an earlier date than heretofore, and to this end arrangements have been made to begin the work in September. In order to do this, members from these sections are earnestly requested to turn in their addressed slips as early as possible.

The following statement shows the amounts of seeds, bulbs, plants, and trees, so far as the allotments have been made, for the fiscal year 1902–3.

Each Senator, Member, and Delegate will receive:

Vegetable seed, 12,000 packages, 5 papers each.

Novelties, vegetable seed, 500 packages, 5 papers each.

Flower seed, 500 packages, 5 papers each.

Tobacco seed, 110 packages, 5 papers each, to districts growing tobacco.

Cotton seed, 70 packages, 1 peck each, to districts growing cotton.

Lawn grass seed, 30 packages.

Forage crop seed, allotment not yet made.

Sorghum seed, allotment not yet made.

Sugar-beet seed, allotment not yet made.

Bulbs, 10 boxes, 35 bulbs each; or 20 boxes, 17 bulbs each.

Grapevines, 8 packages, 5 vines each.

Strawberry plants, 10 packages, 15 plants each.

Trees, 20 packages, 5 trees each.

Note.—One frank will be required for each package given above, and if more than one package is to be sent to one individual it will be necessary to have an addressed frank for each package. The smallest mail sacks used hold approximately 100 packages of vegetable or flower seed, and if it is desired to send less than this number to any one individual it will be necessary, in order to meet the post-office requirements, to have an addressed frank for each package. Over 100 packages, however, may be sent under one addressed frank, provided blank facsimile slips, to the number of packages desired,

accompany the address. In other words, if it is desired to send 200 packages of seed to one individual, one addressed frank and 199 blank franks, with the name of the Senator, Member, or Delegate printed thereon, will answer.

In sending addressed slips to the Department, please, in every case, plainly mark each lot with the name of the seeds or plants the slips are to cover, otherwise the Department will be unable to tell what is wanted.

Respectfully submitted.

B. T. Galloway,
Chief of Bureau.

Approved:
James Wilson, *Secretary.*

Washington, D. C., *May 28, 1902.*

[Circular sent to recipients of seeds of novelties and specialties included in Section 1 of the scheme of distribution.]

DISTRIBUTION OF NOVELTIES AND SPECIALTIES.

SECTION 1.

The varieties included in this special distribution are either new or are not as well known as they should be. The seeds are sent out this year, accompanied by full descriptions of the varieties, in the hope that those who receive them will report the results of their trial to the Department. In making the report, please use the blanks accompanying this circular and return them in the inclosed franked envelope, which requires no postage.

CORN.

Trucker's Favorite.

A variety of field white dent corn, introduced in 1899 by T. W. Wood & Sons, which is recommended by them for table use. It has found some favor as a substitute for sweet corn, but the quality is poor and decidedly inferior to varieties of sweet corn, though much better than the ordinary varieties of field corn. It possesses the advantage over sweet corn in that it can be planted earlier, is hardier, and can be grown successfully sometimes where sweet corn does not grow well. In these respects it resembles the Early Adams or Burlington field corn, which is used so largely as sweet corn, but differs from it principally in being larger eared and later. It is second early in season and follows immediately after Early Adams. The habit of the plant is the same as field corn, and the ears are 14-rowed and handsome. More especially adapted for large truckers than for home gardeners to whom quality is more of a consideration than hardiness.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

BEET.

Crimson Globe.

An entirely distinct variety introduced in 1900 by Peter Henderson & Co.

Different from other kinds principally in its deep dark crimson color, and valuable on this account as well as for earliness, beautiful globe shape, and perfectly smooth roots, which are entirely free from root hairs, rootlets, and markings. The taproot is also very fine and slender and the top very smooth, with small crown. The roots are, however, very small, but, the leaves being also small and very erect in habit, the plants can be grown very close together and large crops obtained. The leaves are dark green in color. The flesh is a deep crimson and beautifully zoned with dark crimson and a lighter shade; the quality is very sweet and tender, never coarse nor woody. The season is about the same as Detroit Dark Red.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

LETTUCE.

Wood's Cabbage.

This appears to be a strain of the well-known Hubbard's Market and was named and introduced in 1884 by T. W. Wood & Sons, of Richmond, Va. This is not at all a new variety or even a distinct sort, but is deserving of attention as an especially pure and even stock of Hubbard's Market, from which it was probably developed.

The plant is medium early, medium large, thick-leaved, very solid and compact, strictly cabbage-heading in habit, and medium dark solid green in color. It is a good all-round variety, answering splendidly for both forcing under glass and growing outdoors either in early spring or midsummer. The quality is very fine, being tender and sweet and of a slightly buttery flavor. The plants are hardy and slow to go to seed.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

SQUASH.

Wood's Earliest Prolific.

Originated with market gardeners in Hanover County, Va., and introduced by T. W. Wood & Sons in 1897. It is similar in all respects to the well-known White Bush Scallop, but is said by the originators to be a week to ten days earlier and with scallops not quite so decided and more evenly rounded on the edge.

This variety is a type of the summer squash seen everywhere very early in our markets, and known as cymling in some places and patty-pan in others. The plants are strictly bush in habit and the fruits

flattish and round in shape, with center enlarged and margins flattened and scalloped. In color the fruits are a creamy white, the surface is very smooth, and the rind is exceedingly hard when the fruit is dead ripe. This is the earliest squash obtainable, and though of good quality it is not equal to the winter varieties which are not obtainable till much later in the season.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

TOMATO.

SPARKS'S EARLIANA.

Originated by George C. Sparks, of Philadelphia, and introduced in 1900 by Johnson & Stokes of the same city.

This variety is unquestionably an improvement in extra early tomatoes. While it is just as early as Atlantic Prize and similar sorts, which have formerly held the lead for smooth early tomatoes, it is an improvement on them in smoothness and size, qualities which are generally gained at the expense of earliness. The fruits are the same bright red color and flattened globe shape as Atlantic Prize, but they are a little larger in size and a considerably larger per cent of them are smooth and salable in the best markets.

The vines have fine foliage, are very open in habit, productive, and require but a short time to mature the season's crop.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

A. J. PIETERS, *Botanist in Charge.*

Approved:

B. T. GALLOWAY, *Chief of Bureau.*

[Circular sent to recipients of seeds of novelties and specialties included in Section 2 of the scheme of distribution.]

SECTION 2.

The varieties included in this special distribution are either new or are not as well known as they should be. The seeds are sent out this year, accompanied by full descriptions of the varieties, in the hope that those who receive them will report the results of their trial to the Department. In making the report, please use the blanks accompanying this circular and return them in the inclosed franked envelope, which requires no postage.

BEAN.

JONES'S STRINGLESS WAX.

Originated by A. N. Jones, of Leroy, N. Y., and introduced by American seedsmen in 1898. It is the result of crossing the Yosemite Wax with a white-seeded cross of the Ivory Pod Wax, and combines the superlative quality and fleshy, absolutely stringless pods of the former with the great productiveness and hardiness of the latter. The

"shy" bearing and ill-shaped pods of the Yosemite are eliminated, while the seeds being white makes it especially valuable to market gardeners who wish to use it as a shell bean, in case the marketing of string beans proves unprofitable. The pods are very beautiful, of a waxy white color, cylindrical in shape, and of medium size. The plants are very early, very dwarf in habit, and run remarkably even and pure. This variety is similar to the recently introduced Golden Crown Stringless, and also to the old and well-known Challenge Black Wax, from which it differs principally in color of seed and larger vine.

Seed furnished by D. M. Ferry & Co., Detroit, Mich.

ONION.

Southern Grown Yellow Globe Danvers.

This seed is said by the grower to be specially adapted for the Southern States, and to make better bulbs when planted in the South than seed grown in California even or other sections of the country.

The variety is the old and well-known yellow sort, grown so much more extensively than any other and seen everywhere in our markets. It is deeper in shape than the Yellow Danvers or Flat Danvers, but otherwise is the same. The bulbs are a flat globe shape, of medium size, intermediate in season, medium yellow in color, and of a mild flavor. The variety is hardy, productive, a good keeper, and a good general purpose sort.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

MUSKMELON.

Rocky Ford.

This variety is a strain of the old and well-known Netted Gem, and has been recently developed and grown in immense quantities at Rocky Ford, Colo., whence it has been shipped extensively to all the eastern and northern markets. The variety has been made extremely popular by the Rocky Ford growers, as much on account of the careful shipping they have practiced as for the fine melons they have been able to produce in their ideal melon-growing country. The development of the variety is obscure and disputed. It was first introduced by seedsmen in 1899.

The melon is very early and productive, and the fruit is oval shaped, shallow ribbed, densely netted, small in size, and mottled green and yellow in color. The flesh is green, of the very best quality, and, though not as rich as some others, is not surpassed in sweetness by any, while it is uniformly good and more universally liked than any other.

This seed was carefully selected by D. V. Burrill, of Rocky Ford, Colo., from melons of uniform size that were ideal in every particular.

TOMATO.

Quarter Century.

Originated in Monmouth County, N. J., in 1896 by Dr. William Van Fleet, and introduced in 1900 in trial packets by W. Atlee Burpee & Co. In the following year it was named Quarter Century. It appeared as a sport in the third generation from a cross between Lorillard, a bright scarlet fruit of the ordinary type of foliage, and Dwarf Champion, a purplish-red fruit of dwarf habit.

The variety is unquestionably, as claimed by the introducer, a valuable one, and larger in vine, more productive, and larger fruited than Dwarf Champion, which is the recognized standard dwarf variety. It differs also in being a bright scarlet instead of purplish red. The fruits are medium large, very deep or nearly round in shape, perfectly smooth, and of high quality. It is most like Dwarf Aristocrat and Dwarf Stone, but much larger fruited than the former and not quite so deep scarlet in color as the latter. It is claimed to be more dwarf, compact, and erect in habit than any other bush variety. It can be planted as close as 2½ feet apart each way.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

RADISH.

White Icicle.

Originated by a German grower several years previous to its introduction into this country in 1899 by J. M. Thorburn & Co.

This variety is a decided acquisition to our list of radishes. It is a long, pure white sort, especially superior to other kinds in its good size and length, combined with earliness and strikingly beautiful color, which is of a rich glossy white, entirely free from purple or yellow tints, and very much the same clear white at the top as at the bottom. The stocks run very even in both color and shape, and in the latter respect are very beautiful and different from other long sorts in retaining their fullness to the bottom. The roots are of the very highest quality and rich, tender, and sweet. The plants remain fit for use fairly long before shooting to seed.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

A. J. Pieters, *Botanist in Charge.*

Approved:

B. T. Galloway, *Chief of Bureau.*

[Circular sent to recipients of seeds of novelties and specialties included in Section 3 of the scheme of distribution.]

SECTION 3.

The varieties included in this special distribution are either new or are not as well known as they should be. The seeds are sent out this year, accompanied by full descriptions of the varieties, in the hope

that those who receive them will report the results of their trial to the Department. In making the report, please use the blanks accompanying this circular and return them in the inclosed franked envelope, which requires no postage.

MUSTARD.

Ostrich Plume.

Originated in Augusta, Ga., and introduced in 1897 by the N. L. Willet Drug Company of the same city.

It is claimed by the introducer to be the most beautiful and perfect mustard in cultivation, and as pretty as an ornamental plant. It is described as a large plant, often weighing as much as 5 or 6 pounds, and with tender plumes, very long and finely crimped.

Seed furnished by F. Barteldes & Co., Lawrence, Kans.

BEANS.

Wood's Earliest Hardiest.

Introduced by T. W. Wood & Sons in 1893, and said by them to resemble the well-known Early Mohawk.

The claims for this variety made by the introducers are extreme earliness and hardiness, great productiveness, and fine quality. It is said to excel in these qualities any variety in cultivation; to be able to stand a light frost without injury, and to stand early planting better than any other variety; also on account of its productiveness to be suitable for a main crop or for late planting. The pods are extremely tender and make good snaps, and the dry beans are suitable for winter use as shell beans. The pods are described as very large, long, and flat, and the seeds as white in color.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

LETTUCE.

All Seasons.

A very desirable variety introduced in 1897 by J. C. Vaughan, of Chicago, Ill., but it seems never to have gained any general recognition. Excepting that the seed is black instead of white, it might very generally pass as identical with the well-known Deacon, but it differs from that variety in a number of particulars, the most important of which are its slightly larger size, later season, and rounder head. Where Deacon is liked this variety should be tried, for under some conditions it grows better than the Deacon, though generally it is not so sure a header.

All Seasons is a large, thick-headed, rather soft, but strictly cabbage-heading variety, light green in color, and medium late in season. The quality is very fine, of a soft texture and buttery flavor, and

though it can hardly be said to be strictly delicate in flavor, it is absolutely free from coarseness or bitterness.

Seed furnished by Vaughan's Seed Store, Chicago, Ill.

MUSKMELON.

Rocky Ford.

This variety is a strain of the old and well-known Netted Gem, and has been recently developed and grown in immense quantities at Rocky Ford, Colo., whence it has been shipped extensively to all the eastern and northern markets. The variety has been made extremely popular by the Rocky Ford growers as much on account of the careful shipping they have practiced as for the fine melons they have been able to produce in their ideal melon-growing country. The development of the variety is obscure and disputed. It was first introduced by seedsmen in 1899.

The melon is very early and productive, and the fruit oval shaped, shallow ribbed, densely netted, small in size, and mottled green and yellow in color. The flesh is green, of the very best quality, and, though not as rich as some others, is not surpassed in sweetness by any, while it is uniformly good and more universally liked than any other.

This seed was carefully selected by D. V. Burrill, of Rocky Ford, Colo., from melons of uniform size that were ideal in every particular.

WATERMELON.

Eden.

Originated by Mr. C. H. Mathis, of South Carolina, a large Southern melon grower, and introduced in 1900 by T. W. Wood & Sons. It is said by the introducers to be a cross of the Kolb's Gem and Rattlesnake. It very closely resembles the former, but is superior to it in its larger size, brighter striping, and more symmetrical shape. It also resembles the well-known Dixie and recently introduced Iceberg, but differs from them as well as from Kolb's Gem in the color of seeds, which are white instead of mottled grayish-black, as in these varieties. In what further respects, if any, it differs from Iceberg our trials have not yet fully demonstrated, but it is unquestionably shorter in shape than Dixie. The fruits are of mammoth size, short oval in shape, and brilliantly striped light and dark green. The variety is especially valuable as a shipper, but for home use other varieties of better quality are recommended. The quality is fair, but compared to the finer-grained sorts, such as Peerless and Round Light, it is coarse, stringy, and lacks in sweetness and richness.

Seed furnished by T. S. Williams, Columbia, S. C.

A. J. Pieters, *Botanist in Charge.*

Approved:

B. T. Galloway, *Chief of Bureau.*

[Circular sent to recipients of seeds of novelties and specialties included in Section 4 of the scheme of distribution.]

SECTION 4.

The varieties included in this special distribution are either new or are not as well known as they should be. The seeds are sent out this year, accompanied by full descriptions of the varieties, in the hope that those who receive them will report the results of their trial to the Department. In making the report, please use the blanks accompanying this circular and return them in the inclosed franked envelope, which requires no postage.

CORN.

COSMOPOLITAN.

Originated by E. B. Clark & Co., seed growers of Milford, Conn., and introduced in 1901 by W. Atlee Burpee & Co., of Philadelphia.

This is an extra early variety, of good quality and fair-sized ear. It is not quite so early as Cory. First of All, and other first extra early varieties, but is of better quality and the ears are larger. The kernels are wrinkled, very large, broad, flat, and short. Though not in the least flinty, the seed germinates very well, and can be sown earlier than the later and more wrinkled varieties. The ears are 10 and 12 rowed, very well filled, about the same diameter from end to end, and very handsome.

Seed furnished by W. Atlee Burpee & Co., Philadelphia, Pa.

LETTUCE.

ICEBERG.

Originated in Italy, and first introduced into this country in 1894 by W. Atlee Burpee & Co. Marblehead Mammoth, which was introduced the following year, is sometimes thought to be the same. Undoubtedly stalks of the two are often interchanged, but the true Marblehead Mammoth is more crumpled in leaf and less heading in habit than Iceberg.

The variety is a very large, late, extremely hard, strictly cabbage-heading sort, light green in color. The leaf is very crumpled, slightly tinged with red, and very curly at the margin. In quality it is very tender, crisp, and sweet, but not as delicate in flavor as some of the smaller and less coarse-growing sorts. It is not suitable for forcing, but does well outdoors and stands the heat well. The well-known Hansen and New York varieties are very much like it in all respects except color.

Seed furnished by W. Atlee Burpee & Co., Philadelphia, Pa.

MUSKMELON.

DEFENDER.

This desirable new variety is a result of continued selection of Paul Rose with the especial view of developing fine quality, thick meat, and

thin rind. It was first introduced in 1901 by D. M. Ferry & Co., by whom it was originated. The fruits resemble Paul Rose more than any other, and being considerably larger and more densely netted than that popular variety, it makes a valuable addition to our list of varieties.

The fruits are strikingly beautiful in appearance, and especially distinguished by regular oval shape, even shallow ribbing, thick netting, and rich mottled color. The flesh is of a deep red color, very sweet, rich, and melting, without the coarseness and stringiness of some of the large-growing, green-fleshed sorts. Being firm and solid, the fruits are well adapted for shipping. They are of medium size, and the plants are productive and early.

Seed furnished by D. M. Ferry & Co., Detroit, Mich.

RADISH.

White Icicle.

Originated by a German grower several years previous to its introduction into this country in 1899 by J. M. Thorburn & Co.

This variety is a decided acquisition to our list of radishes. It is a long, pure white sort, especially superior to other kinds in its good size and length, combined with earliness and strikingly beautiful color, which is of a rich glossy white, entirely free from purple or yellow tints, and very much the same clear white at the top as at the bottom. The stocks run very even in both color and shape, and in the latter respect are very beautiful and different from other long sorts in retaining their fullness to the bottom. The roots are of the highest quality, and rich, tender, and sweet. The plants are rather slow to shoot to seed and the roots are fit for use a fairly long time.

Seed furnished by W. Atlee Burpee & Co., Philadelphia, Pa.

ONION.

Extra Early Brown Spanish.

This variety has been grown and selected for the past few years by C. C. Morse & Co., seed growers, Santa Clara, Cal., and is introduced for the first time this year. The accompanying description was furnished by the growers:

"This onion has been grown for many years in Australia, where it is used for a very early market variety. It is extremely early, and can be had in market at least four weeks before Early Yellow Cracker, Yellow Danvers, Australian Brown, Early Red Globe, or Extra Early Red Flat. It is a half-globe variety, and averages about 2½ inches in diameter. Its color is brown, much the same but a little lighter than Australian Brown. It is mild and sweet, and, while not a good onion for storage, keeps much better than the Bermudas or any of the early white onions. It ripens down evenly, and seldom has any scallions or

stiff necks. With us in California it was ready for market August 1—at least one month before the early varieties mentioned above—and now, October 13, it is still in very good condition for market."

Seed furnished by C. C. Morse & Co., Santa Clara, Cal.

A. J. Pieters, *Botanist in Charge.*

Approved:
B. T. Galloway, *Chief of Bureau.*

[Circular sent to recipients of seeds of novelties and specialties included in section 4a of the scheme of distribution.]

SECTION 4a.

The varieties included in this special distribution are either new or are not as well known as they should be. The seeds are sent out this year, accompanied by full descriptions of the varieties, in the hope that those who receive them will report the results of their trial to the Department. In making the report please use the blanks accompanying this circular and return them in the inclosed franked envelope, which requires no postage.

CORN.

METROPOLITAN.

Introduced in 1898 by Peter Henderson & Co. as a variety combining earliness and good quality to a greater degree than any other. It is claimed to be not only sweet, but to possess also the richness of the later sorts. It is specially recommended to market gardeners as a shipper, and especially to those gardeners who supply the more critical trade. The plant is hardy, dwarf in habit, and extra early in season. The ears are medium sized, 10 to 12 rowed, well filled, and very handsome, with the broad, thick, shallow kernels of the extra early sorts.

LETTUCE.

CRISP AS ICE.

Introduced by the Livingston Seed Company in 1895. Plant is intermediate in season, of medium size, dark-green color, very completely, sometimes almost wholly, washed with dark brown, but the inside leaves are well blanched to a light, bright green. The plant makes a firm and well-defined, somewhat ovate-shaped, cabbage head. The leaves, although very thick, are easily broken, and this, together with its unusually dark, somewhat dull brown color, make it both unfit for and unattractive as a general market garden sort. But for home use or where quality is important this variety is one of the very best. It is extremely tender and crisp and of an unusually delicate and sweet flavor, at the same time also slightly buttery.

Seed furnished by C. C. Morse & Co., Santa Clara, Cal.

MUSKMELON.

Defender.

This desirable new variety is a result of continued selection of Paul Rose with the especial view of developing fine quality, thick meat, and thin rind. It was first introduced in 1901 by D. M. Ferry & Co., by whom it was originated. The fruits resemble Paul Rose more than any other, and, being considerably larger and more densely netted than that popular variety, it makes a valuable addition to our list of varieties.

The fruits are strikingly beautiful in appearance, and especially distinguished by regular oval shape, even shallow ribbing, thick netting, and rich, mottled color. The flesh is of a deep red color, very sweet, rich, and melting, without the coarseness and stringiness of some of the large-growing, green-fleshed sorts. Being firm and solid, the fruits are well adapted for shipping. They are of medium size, and the plants are productive and early.

Seed furnished by D. M. Ferry & Co., Detroit, Mich.

BEET.

Crimson Globe.

An entirely distinct variety introduced in 1900 by Peter Henderson & Co.

Different from other kinds principally in its deep dark crimson color, and valuable on this account as well as for earliness, beautiful globe shape, and perfectly smooth roots, which are entirely free from root hairs, rootlets, and markings. The taproot is also very fine and slender and the top very smooth, with small crown. The roots are, however, very small, but the leaves being also small and very erect in habit the plants can be grown very close together and large crops obtained. The leaves are dark green in color. The flesh is a deep crimson and beautifully zoned with dark crimson and a lighter shade; the quality is very sweet and tender, never coarse nor woody. The season is about the same as Detroit Dark Red.

Seed furnished by J. M. Thorburn & Co., New York.

ONION.

Extra Early Brown Spanish.

This variety has been grown and selected for the past few years by C. C. Morse & Co., seed growers, Santa Clara, Cal., and is introduced for the first time this year. The accompanying description was furnished by the growers:

"This onion has been grown for many years in Australia, where it is used for a very early market variety. It is extremely early, and

can be had in market at least four weeks before Early Yellow Cracker, Yellow Danvers, Australian Brown, Early Red Globe, or Extra Early Red Flat. It is a half-globe variety, and averages about 2½ inches in diameter. Its color is brown, much the same but a little lighter than Australian Brown. It is mild and sweet, and while not a good onion for storage, keeps much better than the Bermudas or any of the early white onions. It ripens down evenly, and seldom has any scallions or stiff necks. With us in California it was ready for market August 1, at least one month before the early varieties mentioned above, and now, October 13, it is still in very good condition for market."

Seed furnished by C. C. Morse & Co., Santa Clara, Cal.

A. J. Pieters, *Botanist in Charge.*

Approved:

B. T. Galloway, *Chief of Bureau.*

[Circular sent to recipients of seeds of novelties and specialties included in Section 5 of the scheme of distribution.]

SECTION 5.

The varieties included in this special distribution are either new or are not as well known as they should be. The seeds are sent out this year, accompanied by full descriptions of the varieties, in the hope that those who receive them will report the results of their trial to the Department. In making the report, please use the blanks accompanying this circular and return them in the inclosed franked envelope, which requires no postage.

MUSKMELON.

Rocky Ford.

This variety is a strain of the old and well-known Netted Gem, and has been recently developed and grown in immense quantities at Rocky Ford, Colo., whence it has been shipped extensively to all the eastern and northern markets. The variety has been made extremely popular by the Rocky Ford growers as much on account of the careful shipping they have practiced as for the fine melons they have been able to produce in their ideal melon-growing country. The development of the variety is obscure and disputed. It was first introduced by seedsmen in 1899.

The melon is very early and productive, and the fruits are oval shaped, shallow ribbed, densely netted, small in size, and mottled green and yellow in color. The flesh is green, of the very best quality, and, though not as rich as some others, is not surpassed in sweetness by any, while it is uniformly good and more universally liked than any other.

This seed was carefully selected by D. V. Burrill, of Rocky Ford, Colo., from melons of uniform size that were ideal in every particular.

BEAN.

Thorburn's Prolific Market.

A foreign type of bean obtained by J. M. Thorburn & Co. from Vienna, Austria, and first introduced by them in 1894.

It is claimed by the introducers to be an enormously productive variety, bearing its pods in thick clusters of 35 to 40 pods to a plant, and exceedingly vigorous, healthy, and remarkably rust proof. The pods are light green in color, very long and perfectly round in shape, solid fleshed, and of a very soft and marrowy texture. The vines are very large and erect in habit; the leaves, very dark; seeds, black; season, late. It is claimed by the originators that for productiveness, solidity of flesh, and roundness of pod it excels any variety now in cultivation.

Seed furnished by J. M. Thorburn & Co., New York.

TOMATO.

Success.

Originated in 1897 by M. M. Miesse, a market gardener and tomato specialist of Lancaster, Ohio. Introduced in 1900 by Wm. Henry Maule under the name of "Maule's 1900," and in the following year called "Success."

This is an excellent, very large, smooth, deep scarlet variety, similar to many other recently introduced varieties, such as Noble, Century, and Marvel, but said to be superior to them in productiveness, smoothness of fruit, and to be more free from any hard or green core. The variety does undoubtedly combine these qualities to a very large degree, and, as claimed, is of excellent quality and a splendid sort for either the canner, trucker, or private gardener. The foliage is of the common large-leaved kind, and the vines are strong and vigorous. The season is second early. The fruits are a deep flat globe shape, or as nearly globular in form as it is possible to obtain a large tomato.

Seed furnished by M. M. Miesse & Son, Lancaster, Ohio.

RADISH.

Glass.

A variety introduced by F. Barteldes & Co. and Northrup, King & Co., as claimed, about ten years ago, the former obtaining his seed from a Denver (Colo.) market gardener and the latter from Cincinnati market gardeners. The variety is considered by many to be identical with the Cincinnati Market and Long Scarlet Short Top varieties, but a few claim that it is not quite so long and that it possesses to a degree greater than Long Scarlet Short Top the peculiar transparency which gives rise to its name.

The roots are very long and tapering, exceedingly smooth, free from root hairs, of a brilliant scarlet color, making it altogether the most handsome and showy of the long red varieties. The variety is medium early in season and remains fit for use fairly long before shooting to seed. The flesh is mild and tender. As the tops are very small, the roots can be planted close together.

Seed furnished by Northrup, King & Co., Minneapolis, Minn

SQUASH.

GOLDEN BRONZE.

This variety is the result of an accidental cross between the Bay State and Boston Marrow found by Mr. Aaron Low, of Hingham, Mass., in 1896. After being improved by Mr. Low this variety was sold to James J. H. Gregory & Son, who introduced it in 1899 as "No. 7," and in the following year named it "Golden Bronze." The variety is of the same general pointed oval shape as the Boston Marrow, viz, very sloping at stem end and almost blunt at blossom end. The surface is also wrinkled as in Boston Marrow, but in color is a dark grayish green, turning to a greenish bronze on the upper surface when fully ripe. The flesh is a bright golden yellow, fine grained, and of excellent quality. The variety is early, productive, hardy, and a good keeper.

Seed furnished by T. W. Wood & Sons, Richmond, Va.

A. J. PIETERS, *Botanist in Charge.*

Approved:

B. T. GALLOWAY, *Chief of Bureau.*

[Circular sent to recipients of seeds of novelties and specialties included in Section 5a of the scheme of distribution.]

SECTION 5a.

The varieties included in this special distribution are either new or are not as well known as they should be. The seeds are sent out this year, accompanied by full descriptions of the varieties, in the hope that those who receive them will report the results of their trial to the Department. In making the report please use the blanks accompanying this circular and return them in the inclosed franked envelope, which requires no postage.

BEAN.

THORBURN'S PROLIFIC MARKET.

A foreign type of bean obtained by J. M. Thorburn & Co. from Vienna, Austria and first introduced by them in 1894.

It is claimed by the introducers to be an enormously productive variety, bearing its pods in thick clusters of 35 to 40 pods to a plant,

and to be also exceedingly vigorous, healthy, and remarkably rust proof. The pods are light green in color, very long, and perfectly round, solid fleshed, and of a very soft and marrowy texture. The vines are very large and erect in habit, the leaves very dark, the seeds black, and season late. It is claimed by the originators that for productiveness, solidity of flesh, and roundness of pod it excels any variety now in cultivation.

Seed furnished by J. M. Thorburn & Co., New York.

TOMATO.

Success.

Originated in 1897 by M. M. Miesse, a market gardener and tomato specialist of Lancaster, Ohio. Introduced in 1900 by William Henry Maule under the name of "Maule's 1900" and in the following year called "Success."

This is an excellent, very large, smooth, deep scarlet variety, similar to many other recently introduced varieties, such as Noble, Century, and Marvel, but said to be superior to them in productiveness and smoothness of fruit and to be more free from any hard or green core. The variety does undoubtedly combine these qualities to a very large degree and, as claimed, is of excellent quality and a splendid sort for either the canner, trucker, or private gardener. The foliage is of the common large-leaved kind, and the vines are strong and vigorous. The season is second early. The fruits are a deep flat globe shape, or as nearly globular in form as it is possible to obtain a large tomato.

Seed furnished by M. M. Miesse & Son, Lancaster, Ohio.

MUSKMELON.

Rocky Ford.

This variety is a strain of the old and well-known Netted Gem, and has recently been developed and grown in immense quantities at Rocky Ford, Colo., whence it has been shipped extensively to all the eastern and northern markets. The variety has been made extremely popular by the Rocky Ford growers as much on account of the careful shipping they have practiced as for the fine melons they have been able to produce in their ideal melon-growing country. The development of the variety is obscure and disputed. It was first introduced by seedsmen in 1899.

The melon is very early and productive and the fruits oval shaped, shallow ribbed, densely netted, small in size, and mottled green and yellow in color. The flesh is green, of the very best quality, and, though not as rich as some others, is not surpassed in sweetness by any, while it is uniformly good and more universally liked than any other.

This seed was carefully selected by D. V. Burrill, of Rocky Ford, Colo., from melons of uniform size that were ideal in every particular.

RADISH.

Glass.

A variety introduced by F. Barteldes & Co. and Northrup, King & Co., as claimed, about ten years ago, the former obtaining his seed from a Denver (Colo.) market gardener and the latter from Cincinnati market gardeners. The variety is considered by many to be identical with the Cincinnati Market and Long Scarlet Short Top varieties, but a few claim that it is not quite so long and that it possesses to a greater degree than the Long Scarlet Short Top the peculiar transparency which gives rise to its name.

The roots are very long and tapering, exceedingly smooth, free from root hairs, of a brilliant scarlet color, making it altogether the most handsome and showy of the long red varieties. The variety is medium early in season and remains fit for use fairly long before shooting to seed. The flesh is mild and tender. As the tops are very small, the roots can be planted close together.

Seed furnished by Northrup, King & Co., Minneapolis, Minn.

SQUASH.

Golden Hubbard.

A sport of the well-known Hubbard, introduced in 1896 by Storrs & Harrison Co. An exceedingly valuable introduction and entirely distinct. It is considered by many to be the best fall and winter variety yet introduced and has now become a standard sort. The variety is similar to the Hubbard, except in color, which is a deep orange yellow, with a slight greenish tinge at the extreme blossom end, and although somewhat smaller in size it is more productive than its parent. The variety is of large size, pointed oval in shape, extremely warty, and a good keeper. The flesh is fine grained, very dry, rich, sweet, and in color a deep orange extending clear to the rind, without the objectionable greenish tinge found in the Hubbard.

Seed furnished by W. Atlee Burpee & Co., Philadelphia, Pa.

A. J. Pieters, *Botanist in Charge.*

Approved:

B. T. Galloway, *Chief of Bureau.*

[Circular sent to recipients of seeds of novelties and specialties included in Section 6 of the scheme of distribution.]

SECTION 6.

The varieties included in this special distribution are either new or are not as well known as they should be. The seeds are sent out this year, accompanied by full descriptions of the varieties, in the hope that those who receive them will report the results of their trial to the

Department. In making the report, please use the blanks accompanying this circular and return them in the inclosed franked envelope, which requires no postage.

PEA.

Thomas Laxton.

Originated by Messrs. Thomas Laxton & Co., of Bedfordshire, England, and first catalogued by American seedsmen in 1901. Said to be a cross between a seedling of Gradus and a seedling from the extra early varieties.

This is another of the new and very desirable varieties of the large-seeded, large-podded, extra early class of peas which have followed upon the introduction of the Gradus in 1897. It is very much like that variety, but is said to be slightly earlier and hardier. The pods, however, are shorter and not so large and handsome, while in color they are darker, and in shape square instead of pointed at the end. The quality is very good, but not equal to Gradus, and partakes more of the flavor of the ordinary extra early varieties. Its great value lies in its large showy pods, combined with extreme earliness and fair hardiness of plant.

Seed furnished by Northrup, King & Co., Minneapolis, Minn.

BEET.

Ruby Dulcet.

A very popular beet in England. First introduced in this country in 1899 by Johnson & Stokes.

An especially valuable introduction, and very distinct from other globe-shaped beets in its greater depth. The color is a deep red, the shape a deep globe, very full at the top and holding its size well to the bottom, while the surface is very smooth and entirely free from root hairs, rootlets, or markings. The leaves are medium dark red in color and being very small and erect in habit, the variety is therefore suitable for close planting. The season is early, or about the same as Detroit Dark Red. The flesh is very dark and zoned with deep red and a lighter shade; the quality is fine grained, sweet, and tender.

Seed furnished by Johnson & Stokes, Philadelphia, Pa.

TOMATO.

Thorburn's Earliest.

Originated by J. M. Thorburn & Co., and introduced by them in 1902. This variety was obtained by selection of a number of English

greenhouse sorts grown for several seasons out of doors in the vicinity of New York.

It is claimed by the introducers to be the earliest tomato grown and to be five days earlier than the Atlantic Prize, which is the most generally grown extra early sort. This variety is undoubtedly a splendid introduction and extremely early, but of small size. Compared to Atlantic Prize, it is considerably smaller in size but much superior to it in being smoother, less corrugated and scarred, and more of a globe shape. It is similar to Conference and to Bright and Early, but considerably earlier than either, and much larger than the latter. The plants have the fine leaf and habit of growth of the extra early varieties. The fruits are bright scarlet, flat globe shape, and perfectly smooth. Specially recommended for forcing, but a splendid outdoor sort also.

Seed furnished by J. M. Thorburn & Co., New York.

LETTUCE.

Half Century.

A very old variety of foreign origin, seldom catalogued by American seedsmen. John Lewis Childs, of Floral Park, N. Y., it seems, was the first American seedsman to catalogue it, or at least the first to claim for it any special superiority.

The plant is very dark green in color, of a peculiarly loose, flabby, half-heading habit. It is difficult to make it head well under any conditions, and on account of its behavior in this respect, as well as its weak growth and decidedly inferior appearance, it will never be a general favorite. Its value lies solely in its extra fine quality, for it is exceedingly brittle and tender and of unsurpassed sweetness. The quality is of that delicacy which is free from the buttery quality of some kinds, and the hard crispness, the coarseness, and the strong, slightly bitter quality of some other kinds. The leaves, which are exceedingly brittle but thick, are easily broken. The variety will not stand the least transportation, and is suitable for the home garden only.

Seed furnished by Vaughan's Seed Store, Chicago, Ill.

MUSKMELON.

Rocky Ford.

This variety is a strain of the old and well-known Netted Gem, and has been recently developed and grown in immense quantities at Rocky Ford, Colo., whence it has been shipped extensively to all the eastern and northern markets. The variety has been made extremely popular by the Rocky Ford growers as much on account of the careful shipping they have practiced as for the fine melons they have been able to

produce in their ideal melon-growing country. The development of the variety is obscure and disputed. It was first introduced by seedsmen in 1899.

The melon is very early and productive, and the fruits small and oval shaped, shallow ribbed, densely netted, mottled green and yellow. The flesh is green, of the very best quality, and, though not as rich as some others, is not surpassed by any, while it is uniformly good and more universally liked than any other.

This seed was carefully selected by D. V. Burrill, of Rocky Ford, Colo., from melons of uniform size that were ideal in every particular.

A. J. Pieters, *Botanist in Charge.*

Approved:
B. T. Galloway, *Chief of Bureau*

[Circular sent to recipients of seeds of novelties and specialties included in Section 6a of the scheme of distribution.]

SECTION 6a.

The varieties included in this special distribution are either new or are not as well known as they should be. The seeds are sent out this year, accompanied by full descriptions of the varieties, in the hope that those who receive them will report the results of their trial to the Department. In making the report please use the blanks accompanying this circular and return them in the inclosed franked envelope, which requires no postage.

PEA.

Prolific Early Market.

Originated by N. B. Keeney & Sons, and first introduced by A. W. Livingston & Sons and William Henry Maule in 1901. The variety is descended from a plant found by Mr. Keeney in Extra Early about twelve years ago.

This valuable acquisition to the extra early varieties resembles Alaska, and like it and other extra-early, smooth-seeded sorts is of poor quality but hardy, which latter characteristic enables it to be planted much earlier and ripened pods obtained far in advance of the less hardy but better quality peas. The pods are very much larger and contain more peas, and the plant is considerably more productive than other extra-early varieties, is a great improvement over them in many respects and only three or four days later. The vine is tall and slender like Extra Early, but considerably larger. The pods are of medium size, light green in color, round, straight, and attractive.

Seed furnished by A. W. Livingston & Sons, Columbus, Ohio.

BEET.

Ruby Dulcet.

A very popular beet in England. First introduced in this country in 1899 by Johnson & Stokes.

An especially valuable introduction, and very distinct from other globe-shaped beets in its greater depth. The color is a deep red, the shape a deep globe, very full at the top and holding its size well to the bottom, while the surface is very smooth and entirely free from root hairs, rootlets, or markings. The leaves are medium dark red in color, and being very small and erect in habit, the variety is therefore suitable for close planting. The season is early, or about the same as Detroit Dark Red. The flesh is very dark and zoned with deep red and a lighter shade; the quality is fine grained, sweet, and tender.

Seed furnished by Johnson & Stokes, Philadelphia, Pa.

TOMATO.

Thorburn's Earliest.

Originated by J. M. Thorburn & Co., and introduced by them in 1902. This variety was obtained by selection of a number of English greenhouse sorts grown for several seasons out of doors in the vicinity of New York.

It is claimed by the introducers to be the earliest tomato grown and to be five days earlier than the Atlantic Prize, which is the most generally grown extra-early sort. This variety is undoubtedly a splendid introduction and extremely early, but of small size. Compared to Atlantic Prize it is considerably smaller in size, but much superior to it in being smoother, less corrugated and scarred, and more of a globe shape. It is similar to Conference and to Bright and Early, but considerably earlier than either, and much larger than the latter. The plants have the fine leaf and habit of growth of the extra-early varieties. The fruits are bright scarlet, flat globe shape, and perfectly smooth. Specially recommended for forcing, but a splendid outdoor sort also.

Seed furnished by J. M. Thorburn & Co., New York.

LETTUCE.

Half Century.

A very old variety of foreign origin, seldom catalogued by American seedsmen. John Lewis Childs, of Floral Park, N. Y., it seems, was the first American seedsman to catalogue it, or at least the first to claim for it any special superiority.

The plant is very dark green in color, of a peculiarly loose, flabby, half-heading habit. It is difficult to make it head well under any conditions, and on account of its behavior in this respect, as well as its weak growth and decidedly inferior appearance, it will never be a general favorite. Its value lies solely in its extra fine quality; for it is exceedingly brittle and tender, and of unsurpassed sweetness. The quality is of that delicacy which is free from the buttery quality of some kinds, and the hard crispness, the coarseness, and the strong, slightly bitter quality of some other kinds. The leaves, which are exceedingly brittle but thick, are easily broken. The variety will not stand the least transportation, and is suitable for the home garden only.

Seed furnished by Vaughan's Seed Store, Chicago, Ill.

MUSKMELON.

Rocky Ford.

This variety is a strain of the old and well-known Netted Gem, and has been recently developed and grown in immense quantities at Rocky Ford, Colo., whence it has been shipped extensively to all the eastern and northern markets. The variety has been made extremely popular by the Rocky Ford growers as much on account of the careful shipping they have practiced as for the fine melons they have been able to produce in their ideal melon-growing country. The development of the variety is obscure and disputed. It was first introduced by seedsmen in 1899.

The melon is very early and productive, and the fruits small and oval shaped, shallow ribbed, densely netted, mottled green and yellow. The flesh is green, of the very best quality, and, though not as rich as some others, is not surpassed by any, while it is uniformly good and more universally liked than any other.

This seed was carefully selected by D. V. Burrill, of Rocky Ford, Colo., from melons of uniform size that were ideal in every particular.

A. J. Pieters, *Botanist in Charge.*

Approved:

B. T. Galloway, *Chief of Bureau.*

[Circular sent to recipients of bulbs.]

DIRECTIONS FOR PLANTING BULBS.

The bulbs sent herewith are of three kinds, viz. (1) hyacinth, (2) tulip, and (3) narcissus.

To obtain the best results, plant the bulbs as soon as received, in soil well loosened to a depth of at least 10 inches, setting them as follows: The hyacinth bulbs 7 inches apart and 4 inches deep, the tulip bulbs 5 inches apart and 4 inches deep, and the narcissus bulbs about 10 inches apart and 5 inches deep. If the hyacinths or tulips are to be grown in pots or window boxes, use rich, well-drained soil; place the pots or boxes in a dark room or cellar for a month or more after planting, or until the roots are formed, and then bring them

FIG. 5.—Hyacinth, tulip, and narcissus bulbs.

into the light. Keep the soil in these pots or boxes well watered, but avoid overwetting, otherwise the bulbs may rot.

[Circular sent to recipients of cotton seed.]

DISTRIBUTION OF COTTON SEED IN 1903.

PLAN OF DISTRIBUTING THE VARIETIES.

The Bureau of Plant Industry has in progress investigations in the improvement of cotton, and as a foundation for such work it is necessary to determine the varieties best suited to each section of the cotton belt. The distribution of cotton seed is thus arranged with the view of furnishing growers with seed of new varieties to test in comparison

with the varieties they already grow. This will enable them to make comparisons and select varieties best suited to their climatic and soil conditions. Information regarding the success of varieties in different sections is as yet too meager to enable a judgment to be formed as to which will succeed best in a certain locality. In the distribution of cotton seed it is proposed to select, so far as possible, new and little-known varieties which have proved valuable in certain localities, and distribute the seed in such a way as to insure their being generally tested throughout the cotton States. It is intended at the end of the season to follow up each package with a circular in order to obtain information in regard to the success in various sections of the varieties distributed. Growers receiving the seed are urged to cooperate with the Department of Agriculture by making a careful test of the seed which is sent with this circular. In another part of the circular will be found descriptions of the varieties distributed and a statement of the points on which information is desired.

In the distribution the present season several special features have been introduced. The studies of the cotton industry which the Department has been prosecuting strongly indicate that the growing of long-staple cottons is destined to become much more general in the near future and should be encouraged. Seeds of Griffin and Allen Improved, two of the best long-staple Upland cottons, have thus been procured for distribution. A second special feature of the distribution the present season is the Rivers Sea Island cotton, a variety resistant to the serious malady known as wilt or black-root. This cotton has been produced as a result of breeding experiments conducted in conjunction with the Department of Agriculture. A special circular is sent out with the seed of this variety, and it is therefore not described herein. This seed will be distributed in the Sea Island sections of Georgia and Florida. Seabrook Sea Island cotton will also be sent to the same region.

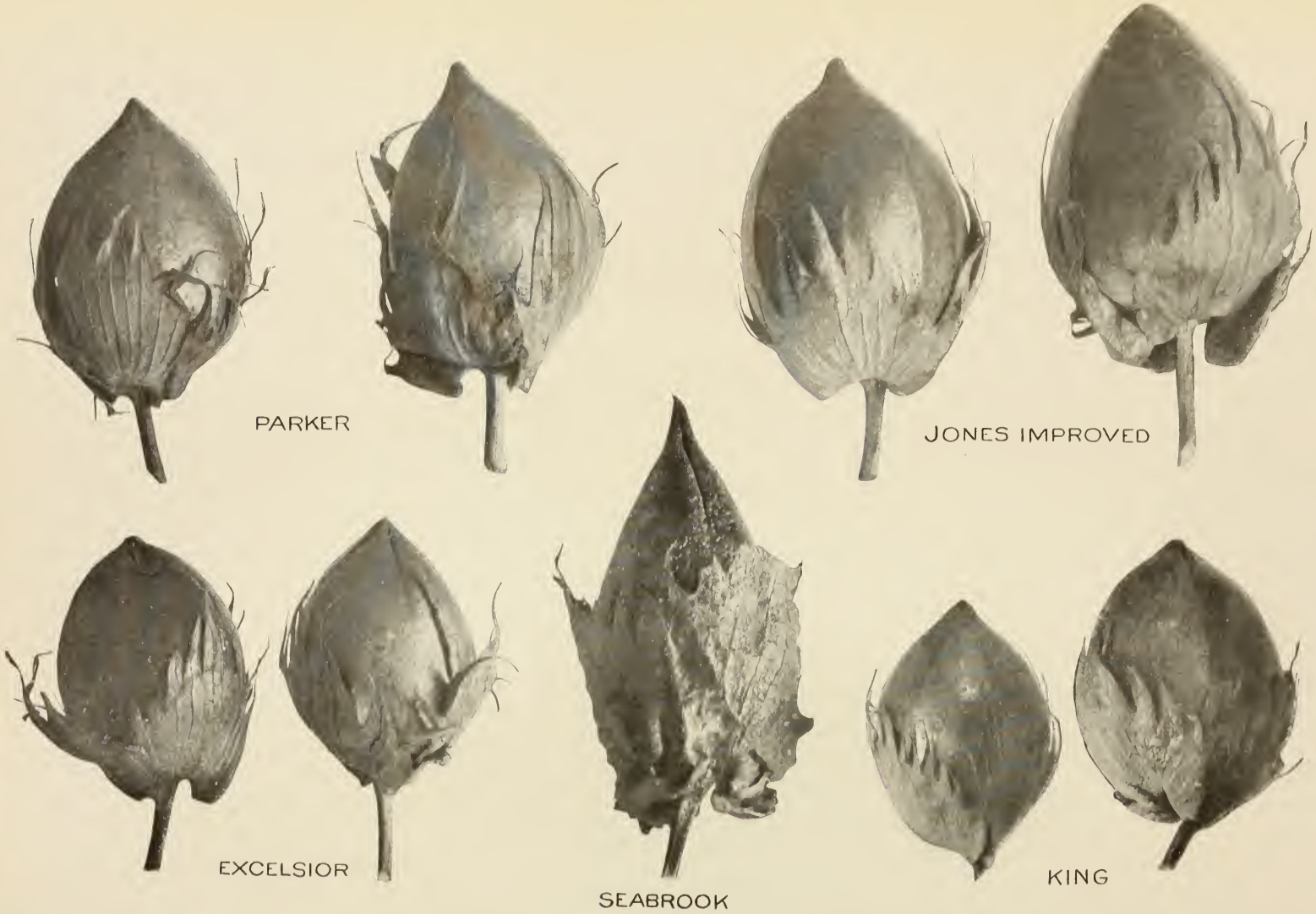
The varieties of ordinary short-staple Upland cotton selected for distribution this year are Parker, Jones Improved, Excelsior, and King. The last-named variety has been procured particularly for distribution in the boll-weevil districts of Texas, because it is probably the earliest of all known varieties, and early ripening sorts have been found to escape damage by boll weevil to a large extent.

The varieties are to be distributed to the different Congressional districts as follows:

Alabama:
First, Third, Fifth, and Eighth districts: Jones and Allen.
Second, Sixth, Seventh, and Ninth districts: Excelsior and Griffin.
Fourth district: Parker and Excelsior.

Arkansas:
First, Second, Third, and Sixth districts: Parker and Allen.
Fourth and Fifth districts: Jones and Griffin.

Florida, First and Second districts: Seabrook and Rivers.



MATURE UNOPENED COTTON BOLLS—PARKER, JONES IMPROVED, MOORE EXCELSIOR, KING, AND SEABROOK SEA ISLAND (NATURAL SIZE).

Bul. 25 Bureau of Plant Industry U. S. Dept. of Agriculture

GEORGIA:
First, Second, and Eleventh districts: Seabrook and Rivers.
Fourth, Sixth, Seventh, and Ninth districts: Excelsior and Allen.
Third and Fifth districts: Parker and Jones.
Eighth and Tenth districts: Parker and Griffin.
LOUISIANA:
Third and Fourth districts: Excelsior and Allen.
Fifth and Sixth districts: Parker and Griffin.
MISSISSIPPI:
Second and Sixth districts: Jones and Griffin.
First, Third, Fifth, and Seventh districts: Parker and Allen.
Fourth district: Excelsior and Griffin.
NORTH CAROLINA:
First, Third, Fourth, and Eighth districts: Parker and Excelsior.
Second, Fifth, Sixth, and Seventh districts: Excelsior and Jones.
SOUTH CAROLINA:
First district: Parker and Griffin.
Third, Fourth, Fifth, and Sixth districts: Excelsior and Griffin.
Second and Seventh districts: Parker and Allen.
TENNESSEE:
Third and Fourth districts: Parker and Excelsior.
Fifth and Eighth districts: Jones and Griffin.
Sixth, Seventh, Ninth, and Tenth districts: Parker and Griffin.
TEXAS:
First, Second, and Thirteenth districts: Excelsior and King.
Third, Fourth, Eighth, and Tenth districts: Parker and King.
Fifth and Sixth districts: King and Allen.
Seventh and Ninth districts: King and Griffin.
Eleventh and Twelfth districts: Jones and King.
OKLAHOMA: Excelsior and Allen.

DESCRIPTION OF VARIETIES DISTRIBUTED.

SHORT-STAPLE UPLAND VARIETIES.

JONES IMPROVED.

This is a big-boll Upland cotton (Pl. I), said to have been introduced into America from Algiers by Wyche brothers about the year 1857. The history of the introduction, as given by Mr. J. F. Jones, who has been instrumental in bringing the variety into prominence, is as follows:

About 1853 two brothers of a family by the name of Wyche emigrated from Germany, one coming to the United States and the other going to Algiers, on the Mediterranean coast, to work for a French colony engaged there in growing cotton. About 1857 the Algerian brother sent a small package of cotton seed to his brother in the United States. Before the brother in this country had time to fully test the merit of the variety he died. The war between the States came on shortly afterwards, when neglect and lack of conveniences resulted in almost destroying any trace of the variety. In fox hunting over the Wyche plantation I discovered places here and there where there was a wonderful growth of this particular variety. By permission I went into the fields and selected some of the seed, having to assist me a Methodist minister by the name of Warren Beggarly, who later sold some of the seed of the variety to the Government. Beggarly died shortly afterwards and left the

work to me, and since 1877 I have been proprietor of the variety and have had charge of its distribution. From the records you will see that I have furnished seed of this variety to the Government since about 1884, and to our State agricultural farms since about 1877. I have preserved the variety and kept it pure.

Mr. Jones claims that this was the first big-boll, white-seeded cotton grown in this country, and that other big-boll types have been derived from it. Culpepper, a big-boll variety distributed last year, is said to be a hybrid of the Wyche (Jones Improved) and Dixon varieties. It has probably entered into the parentage of many of our best big-boll types.

The variety is recommended as deep-rooting, drought-resistant, and as withstanding adverse conditions with little injury. It is a large, robust, vigorous plant, producing heavily under ordinary conditions. It continues to grow late in the season and forms a good top crop when the conditions are favorable.

Plant vigorous and prolific, with wide spreading branches from near the base; upper branches usually short. Bolls large, $1\frac{3}{4}$ to 2 inches long, ovate, blunt pointed, 5-locked, opening well. Seeds 6 to 10 to the lock, medium large, weighing from 0.13 to 0.14 gram, covered with grayish fuzz, well covered with lint. Lint good for Upland, 1 to $1\frac{1}{8}$ inches in length, strong. Per cent of lint 31 to 32 under ordinary conditions. Season medium late.

The seed of this variety distributed was grown by James F. Jones, at Hogansville, Ga., in the season of 1902.

PARKER.

Parker cotton (Pl. I) was originated by John M. Parker, sr., in Bolivar County, Miss., about 1868. It was produced by careful selection, and ever since its production has been grown on the extensive Parker plantations in preference to all other varieties. Mr. John M. Parker, jr., the present owner of the plantations, informs the writer that care has been exercised for years in selecting the seed and preserving the variety in a high state of productivity.

In a variety test at Columbia, S. C., in the season of 1902, this variety gave very excellent results. The plants were from $3\frac{1}{2}$ to 4 feet high, vigorous, and well fruited. In season it was one of the earliest of about fifty ordinary sorts. The lint is very good for an ordinary Upland variety, being strong, hard, silky, and above the ordinary in length, averaging on Mr. Parker's plantation from $1\frac{1}{8}$ to $1\frac{3}{16}$ inches long. Mr. Parker recommends the variety as hardy, vigorous, prolific, and easy to pick.

Plant of Peterkin type, having an erect central stem, with numerous lateral limbs. Bolls medium size, round or ovate, blunt-pointed, 5-locked, opening well. Seeds 7 to 9 per lock, medium size, gray, tufted, well covered. Lint long, $1\frac{1}{8}$ to $1\frac{3}{16}$ inches, white, strong. Per cent of lint, 31 to 33. Season medium early.

The seed distributed by the Department of Agriculture was grown by John M. Parker, jr., on the plantation on which the variety originated, at Maxime, Bolivar County, Miss.

EXCELSIOR.

Excelsior is a variety of Upland short-staple cotton (Pl. I) which has become popular in certain parts of South Carolina, and was awarded a gold medal at the Charleston Exposition. The variety was produced in 1896 by taking seed from a sport of unknown parentage which exhibited desirable qualities. Since this time the seed has been selected with care to insure its coming true to type and to increase its production. Mr. Moore informs us that every year selections have been made from an experimental breeding patch, culling out inferior stalks and selecting seed from nothing but the best. Under this rigorous selection the plants, it is claimed, have increased in productivity and have become uniform in type, showing now little tendency to sport or revert to a poorer type.

This variety Mr. Moore recommends as being very prolific and giving large yields. In tests at Columbia, S. C., in the season of 1902, the plants averaged about 3½ feet high and were well bolled.

Some doubt exists as to what name can be correctly applied to this cotton. According to Prof. S. M. Tracy, in a statement published in Bulletin 33, United States Department of Agriculture, Office of Experiment Stations, issued in 1896, Mr. C. R. Ezell, of Eatonton, Ga., originated by selection from the variety New Era, a strain to which the name Excelsior was given. Mr. Moore's Excelsior, according to his statement, was originated in 1896, the year of Professor Tracy's publication. Mr. Ezell's Excelsior would therefore have the priority of name. Owing to this confusion of names we would suggest that Mr. Moore's Excelsior be referred to as *Moore Excelsior*, or simply as the *Moore* cotton.

Plant of Peterkin type, with one main stem and spreading lower limbs, the other lateral limbs being comparatively short. Shows some tendency to develop bolls in pairs or clusters. Bolls medium small, ovate or spherical, blunt pointed, 4 to 5 locked, opening well. Seeds small, weighing 0.09 to 0.10 gram, gray, tufted, 7 to 9 per lock. Lint, good ordinary short staple about 1 inch in length. Per cent of lint 32 to 33. Season medium.

The seed of this variety distributed was grown by Mr. C. F. Moore, Bennettsville, S. C., in the season of 1902.

KING.

King, or King's Improved as it has been called, is a very early variety of Upland cotton (Pl. I), originated by T. J. King, of Louisburg, N. C. In attempting to improve the cotton grown on his plantation, Mr. King made tests of very many varieties, but found none that exactly met the requirements as he recognized them. "I therefore determined," he states, "to try to mix the two kinds which, between themselves, appeared to possess all the essentials desired, and

get a composite cotton that combined the good qualities of both varieties." Such a combination he claims to have secured in his King's Improved. The variety has been widely distributed and tested, and is probably as generally known as any other cotton variety. It is very distinct from any other of the well-known varieties.

King is regarded as one of the best varieties for the northern part of the cotton belt, where the season is too short for late varieties. It is the variety most generally planted late in the spring, after oats, as so-called stubble cotton, its short season enabling it to mature a good crop even in the short time then available. The earliness of the variety and its consequent bearing on the boll-weevil question is the principal reason for selecting it for distribution the present season. Observation has shown that the damage caused by the boll-weevil increases as the season advances. In the early part of the season the numbers of the weevils are few, but as the season advances they steadily increase, and become so abundant in the latter part of the season that in badly infested fields hardly a boll is permitted to reach maturity. Many of the bolls which are formed before the weevil has become abundant mature without injury, and the writer has observed many particularly early plants, which, owing to their earliness, escaped damage to a considerable degree and matured a fairly good crop. This feature suggests that one of the most important factors in the control of the boll-weevil is to utilize early-maturing varieties. King is probably the earliest fixed variety known, and as it has given excellent results in tests at the Mississippi Experiment Station, it will probably do well in Texas also. Its use in boll-weevil sections to avoid the ravages of this pest is experimental, and the outcome will be watched with great interest. It is of special importance that growers note the yield of this variety in boll-weevil sections in comparison with other sorts, and be prepared next fall to furnish the Department of Agriculture with a statement of the results obtained. To obtain the best results in sections where the boll-weevil is prevalent, the seed should be planted as early as the season will safely permit.

Plant 2½ to 5 feet high, rather spreading in habit, with numerous limbs gradually decreasing in length from below upward. Bolls small, nearly round, with small blunt point, 4 to 5 locked, opening well. Seeds medium size, weighing from 0.10 to 0.11 gram, covered with brownish or greenish fuzz. Lint white, strong, three-fourths to 1 inch in length. Per cent of lint usually about 33. Season very early.

The seed distributed by the Department of Agriculture was grown by the originator of the variety, Mr. T. J. King, at Louisburg, N. C., in the season of 1902.

Long-Staple Upland Varieties.

ALLEN IMPROVED.

Allen Improved (Pl. II) is a variety of cotton originated in Claiborne County, Miss., in 1899, by James B. Allen. Other and similar vari-

eties were earlier introduced by Mr. Allen under the names Allen Yellow Bloom and Allen Hybrid, which have become distributed throughout the country. Allen Improved was distributed to some extent in 1900, but up to the present time has not been generally distributed. It is said by Mr. Allen to be a cross between his Yellow Bloom and Hybrid. The variety is recommended because of its productiveness and its long staple. The bolls when ripe open up wide, like ordinary Upland, letting the cotton hang out and making it easy to pick. It is said to pick easier than the Allen Hybrid and to have a stronger fiber. Mr. Allen states that it has stood the weather better for the past three years than any other variety of long staple he has ever planted, not rotting in wet weather like the Yellow Bloom. It gives an average yield per acre of about 1,500 pounds of seed cotton and from 300 to 400 pounds of lint. The crop of 1900, Mr. Allen states, sold for 17 cents per pound net; that of 1901 for 15 cents; and that of 1902, from which the seed distributed by the Department was taken, for from 16½ to 17 cents. Mr. Allen's cotton is ginned on a saw gin.

Plant 3 to 6 feet high, compact, branching like Truitt, with two or three long basal limbs and one main central stem. Bolls of Upland type, medium size, slightly pointed, 4 to 5 locked, opening wide. Seeds medium large size, weighing 0.14 to 0.15 gram, gray tufted, 7 to 9 per lock. Lint white, fine, and silky, 1½ to 1⅝ inches long, fairly strong. Per cent of lint 27. Time of ripening midseason.

The seed distributed was grown by James B. Allen, the originator of the variety, at Port Gibson, Miss., in the season of 1902.

GRIFFIN.

Griffin is a long-staple, big-boll Upland cotton (Pl. II), produced by John Griffin at Refuge plantation, near Greenville, Washington County, Miss. The first selection was made in the fall of 1867, and the seed first planted in the spring of 1868. After about ten years of selection some seeds were distributed among friends in the vicinity of Greenville, and a few bushels were sold. The variety, however, has never been generally distributed. Regarding its origin, Mr. Griffin says:

The variety resulted from a cross of the old "Green Seed" cotton with Sea Island, the cross being made to give a tendency to the Green Seed to produce a longer and finer fiber. The hybrid was from 12 to 16 feet high and very unproductive. It was recrossed five years in succession with pollen of the constantly improved Green Seed. This resulted in reducing the stalk to within a few inches of the length of that of Green Seed, in giving it a larger boll, and in making it nearly as prolific. Every successive crossing was made on stalks which least resembled the Sea Island form and most nearly approximated the Sea Island lint.

The selection of the cotton has continued without intermission from 1867 up to the present time (1902). Selection was practiced five years in succession before hybridization was employed, and continued constantly while the latter was going on. There was at first little difference between the two hybrids produced by crossing Sea Island bloom with Green Seed pollen and Green Seed bloom with Sea Island pollen.

The Sea Island was a little more vigorous and had a few more bolls. Near the end of the five years through which both were crossed with constantly improved Green Seed, the Sea Island far surpassed the Green Seed, which was puny and hard to fertilize with the same pollen which had acted well on the other. The lint of the original Green Seed averaged about 1 inch in length. It gained about one-eighth of an inch in length in five years of selection, making it about 1⅛ inches when first crossed with Sea Island. The first cross gave it a length of about 1¼ inches, the lint, furthermore, being much finer than that of the original Green Seed.

The character of the stalk is still like that of Green Seed, though more compact. The boll is larger, 65 weighing a pound. The lint pulled from the seed by the fingers averages about 2 inches in length, and is very fine. Ginned on a saw gin, it generally averages from 1⅜ to 1½ inches in length. The Griffin cotton is earlier than the Green Seed.

Griffin cotton is without question one of the very best long-staple Upland sorts that has ever been produced. It has been grown for two successive years in tests conducted by the Department of Agriculture at Columbia, S. C., and has given excellent results and attracted considerable attention. Its length of staple here averaged about 1½ to 1¾ inches. Unfortunately the lint is not very uniform in length, and is inclined to be low in strength. In size of boll, ease of picking, and productiveness the variety is very good. A peculiar feature of Griffin cotton is its tendency to produce a few very long fibers. Frequently a group of several dozen fibers will reach a length of 2½ or 3 inches.

The average yield per acre at Mr. Griffin's plantation, on Mississippi bottom land not over 20 years old, is about 400 pounds of lint cotton. On fresh land of this sort it yields about 500 pounds of lint cotton per acre. The proportion of lint to seed cotton, Mr. Griffin states, is about 28 per cent. Professor Tracy, at the Mississippi Experiment Station, gave the per cent as 28 to 29. Professor Duggar at the Alabama Experiment Station obtained 29.2 per cent from the crop grown at Auburn, Ala. The crop produced at Columbia, S. C., the past season gave about 29 per cent.

As an indication of the market value of Griffin cotton, Mr. Griffin gives results of sales as follows: When short staple was selling at 5 cents per pound Griffin sold at 8¾ cents. Last year (1901) it sold for 12 cents, against 8 cents for short staple of the same grade. In 1900, when short staple cotton was quoted at between 8 and 9 cents, Griffin sold for 15 cents. A part of the crop of the present year (1902), from which the seed distributed was taken, sold for 14 cents, the average price for short staple of the same grade being 8 cents.

Mr. Griffin states that his crop is regularly ginned on a saw gin. In the crop this year the first 7 bales averaged 1½ inches in length and the last 7 bales 1⅝ inches.

Plant vigorous and prolific, with main central stem and several large spreading limbs below; foliage pale green. Bolls medium large, ovate, blunt-pointed, 4 to 5 locked, opening well. Seeds of medium size, weighing about 0.12 to 0.13 gram, gray tufted, 7 to 10 per lock. Lint white, fine, and silky, rather variable in length, ranging from 1½ to 2 inches. Per cent of lint about 28 to 29. Season medium.

The seed distributed by the Department of Agriculture was grown by the originator of the variety, Mr. John Griffin, at Greenville, Miss., in the season of 1902.

Sea Island Varieties.

SEABROOK.

This variety (Pl. I) was originated ten or twelve years ago by E. L. Rivers, James Island, S. C. Its selection and improvement have been carried on since that time by the present owner, Mr. F. P. Seabrook, of James Island, who has given the most careful attention to the fixing of the desired qualities, the aim being the production of a prolific bearer of medium quality, with a large proportion of lint to seed. The method of selection employed by Mr. Seabrook, which is similar to that of most of the Sea Island planters, is as follows: Several of the best plants in his field are selected and marked. Each of these is picked by itself, the seed cotton weighed, and the lint weighed after ginning to determine the ginning average. The staple is examined critically as to length, fineness, strength, uniformity, and softness. Finally the best plant is selected and the others discarded. The seed from this single stalk is planted by itself, one seed in a hill, and usually produces about 500 plants. The seed from these plants is used to sow a field of about 5 acres, from which the general crop is planted the fourth year. A new plant is chosen from the select field each year, so that the process of improvement is continuous.

Plant of compact habit, prolific, and resistant to disease. Bolls of good size, long and pointed, 3-locked, opening well for Sea Island. Lint 2 inches long. Per cent of lint about 28 to 29.

The seed of this variety distributed was grown by Mr. F. P. Seabrook, James Island, S. C., in the season of 1901.

RIVERS.

The Rivers Sea Island cotton, which is immune to the serious malady known as wilt or "black-root," was produced as a result of special breeding experiments conducted by Mr. E. L. Rivers, of James Island, S. C., in conjunction with the Department of Agriculture. It is highly recommended for cultivation in the Sea Island districts of Georgia and Florida on all soils infected with wilt. A special circular is distributed with the Rivers cotton, and this variety is referred to here simply to show the general plan of the entire cotton distribution for the season. A careful description of the variety and of the experiments leading to its production appears in Bulletin No. 27, Division of Vegetable Physiology and Pathology of the U. S. Department of Agriculture, by Mr. W. A. Orton.

METHODS OF CULTIVATION AND GINNING.

SHORT-STAPLE UPLAND VARIETIES.

The methods of cultivation which should be pursued in growing the varieties of short-staple Upland cotton distributed are the same as those used for any ordinary Upland cotton. No exact directions can be given with respect to the distance apart of the rows or the distance between the plants in the row, as the space required by each plant is determined by the richness of the soil in each case. Jones Improved, King, Excelsior, and Parker are all quite similar in size and habit of growth. Under ordinary conditions satisfactory results would be obtained with these varieties by planting the rows 4 feet apart and the plants from 18 to 24 inches apart in the row. On rich soil this distance should be somewhat increased, while on sterile land closer planting would be desirable.

LONG-STAPLE UPLAND VARIETIES.

Allen Improved and Griffin, while producing a long, fine staple, are in size and general appearance very similar to ordinary short-staple varieties such as Jones Improved and Truitt, and the same cultural methods are to be recommended as are used with the ordinary short-staple sorts. In picking, preserving, and ginning, however, more care is required if the highest market price is to be realized. Greater care should be exercised in the picking to avoid getting the fiber mixed with fragments of leaves, bolls, etc. Fiber from immature and weather-stained bolls should also be discarded. Pickers familiar with ordinary cotton methods are liable to be too careless in their endeavor to gather large quantities and increase their wages thereby. In fine grades of long-staple Upland cotton it would probably also be found desirable to spread the seed cotton on a platform in the sun for a few hours to dry before storing it.

The difficulty of properly ginning long-staple Upland cottons has been considered an impediment to their general cultivation. It is generally recognized that long-staple Sea Island sorts require to be ginned on a roller gin, as the saw gins tear and break the fiber to such an extent as to greatly reduce its value. It is also very generally supposed that the long-staple Upland cottons require to be ginned on a roller gin, and this understanding has prevented many from attempting to grow these cottons, as roller gins are ordinarily accessible only to growers in regions where Sea Island cotton is cultivated Experience has shown, however, that long-staple Upland cottons may be ginned on ordinary saw gins if care is used in the process. Before ginning these cottons the gin saws should be sharpened square across the teeth and then dulled somewhat by use in ginning ordinary short

MATURE UNOPENED AND OPENED COTTON BOLLS—GRIFFIN AND ALLEN IMPROVED (NATURAL SIZE).

staples. It is also important to run the gin at a lower rate of speed than in ginning ordinary short-staple cottons. If these precautions are observed the long-staple Upland cottons may be very satisfactorily ginned on any ordinary saw gin. As previously stated, Mr. Griffin and Mr. Allen have regularly had their crops ginned on ordinary saw gins, and the product has uniformly sold at from 14 to 16 cents or more per pound.

It is also important that growers of long-staple Upland cottons give special attention to the marketing of the product. The writer last season saw several bales of long-staple Upland cotton sold to a buyer at a small interior town in South Carolina for 10 cents which were certainly equal to bales of similar cotton which he saw sold in the New Orleans market the week following at 15 cents, when ordinary cotton was selling at 8¼ cents. Many of the failures with long-staple Upland cotton have been due to the lack of experience on the part of the grower in the matter of marketing. Many buyers take advantage of the growers' ignorance and purchase cotton for 10 cents that is worth 15 cents and realize the difference themselves. Until buyers inform themselves on the value of long-staple cotton and pay reasonable prices, it will have to be consigned to general long-staple markets such as New Orleans, Savannah, Charleston, etc., or to some of the large New England markets.

SEA ISLAND VARIETIES.

The Seabrook selection of Sea Island cotton is adapted to light, sandy land of good fertility. It is planted in rows 5 feet apart, with a distance of from 18 to 20 inches between the plants in the row. Greater care must be given to the cultivation of Sea Island than is usually given to Upland cotton. The land should be thoroughly prepared and well fertilized. A suitable rotation with corn, cowpeas, peanuts, or other crops should be practiced in order to avoid the exhaustion of the soil produced by many successive cotton crops. Cultivation should be very frequent. In the Sea Islands the cotton is cultivated on an average of once a week until August. Here the cotton is grown on high beds and the soil is drawn up around the plants in cultivation. This method is not recommended for Georgia and Florida, however, where the more economical method of level culture will probably pay the best.

Particular care is necessary in picking and handling Sea Island cotton in order to obtain the highest price. Sea Island cotton requires to be picked often—every week or ten days—in order to avoid staining by the weather. All trash, bits of bolls, immature and diseased or yellow locks must be picked out by hand. The seed cotton should be spread on a platform and exposed to the sun for several hours to dry before storing. It must be ginned on a roller gin and be packed carefully in bags without high pressure.

HOW TO GROW PURE SEED OF GOOD QUALITY.

It is a well-known fact that varieties of cotton become mixed and impure unless special care is taken to prevent crossing with other varieties. If growers receiving seed of any of the varieties sent with this circular desire to grow the same variety another year, precaution should be taken to plant the seed in an isolated patch, situated as far as possible from any other varieties. It should be at least a quarter of a mile from any other cotton and preferably in a field surrounded by a forest, particularly on the side nearest to other cotton fields. Before any seed is gathered for planting all plants which are not true to the type of the variety should be carefully weeded out.

If it is desired to keep the variety up to its full productiveness and better adapt it to local conditions, the planter may easily accomplish this by following a simple and inexpensive method of selection. Before beginning the picking, go over the patch carefully and select and mark with a white cloth the best plants; that is, those most productive, earliest in ripening, and having the largest, best formed, and most numerous bolls. Care should also be exercised to select plants that are true to the type of the variety. Before each picking send a careful man over the patch to pick the seed from the selected plants. Preserve such seed separately, gin it separately to avoid mixing, and use this to plant the crop the next year. If this simple method of selection is carried out each year, the yield will doubtless be greatly increased, and as much or more added to the crop than would result from special fertilization or cultivation, though these factors should by no means be neglected. The importance of careful seed selection is seldom fully recognized, and growers are urged to give this factor of cotton culture more careful attention.

HERBERT J. WEBBER,
Physiologist, in Charge of Laboratory of Plant Breeding.

Approved:
A. F. WOODS,
Pathologist and Physiologist.

REPORT OF RESULTS DESIRED FOR PUBLICATION.

In order to determine the comparative values of the different varieties of cotton in various parts of the United States, the growers receiving this seed are requested to give it a thorough trial in comparison with the variety or varieties that they generally grow, and be prepared in the fall of 1903 to report the results of the test to the United States Department of Agriculture. A report will then be requested covering the following points:

(1) Character of the soil.

(2) Character of the season.

(3) Total yield of seed cotton produced. (This should be determined by actually weighing the product.)

(4) Total yield of lint produced. (Determined by actual weighing.)

(5) Size of patch grown. (Determined by actual measurement.)

(6) Yield per acre, estimated from the patch grown.

(7) Is the variety to be classed as excellent, good, fair, or poor for your section?

(8) Name of the variety ordinarily grown by the planter making the test.

(9) Yield of ordinary variety this year on same soil as the variety under consideration.

It is especially requested that growers carefully note the points enumerated above, in order that they may secure the necessary data and be ready to supply accurate information when it is called for next fall. If sufficiently accurate data are furnished, a report will be compiled and issued giving the results of the various trials in all sections, and this report will be sent to all planters cooperating in the experiment. In this way it is hoped to obtain valuable and reliable information regarding the varieties best adapted to various sections of the cotton belt.

Growers receiving this seed, who are willing to cooperate with the Department of Agriculture in making the above test, are requested to fill in the accompanying franked postal card, which requires no postage, as soon as the seed is received, and return the same to the Department.

A. J. Pieters,
Botanist in Charge.

Approved:
B. T. Galloway,
Chief of Bureau.

[Circular sent with seed of Rivers Sea Island cotton.]

RIVERS SEA ISLAND COTTON.

(*A variety resistant to the wilt disease or "Black-root."*)

HISTORY OF THE VARIETY.

This variety, the seeds of which are now distributed for the first time, was originated in connection with the investigations of the United States Department of Agriculture on the cotton wilt, a disease which has done great damage in the South. All other methods of treatment having failed, an effort was made to produce a resistant variety. This was based on the observation that some plants remained healthy, even in the worst infected places, and it was thought that the seed from such stalks might produce other resistant plants. This was

found to be the case, and several strains have been produced in this way by saving seed from healthy plants in the worst diseased areas. The seed of the best of these resistant strains is distributed with this circular, the seed having been grown by special arrangement expressly for the Department of Agriculture. Other selections made by the Department or under its direction are also being grown and tested, and will be used for future distribution.

The Rivers cotton was originated in cooperation with the Department of Agriculture by Mr. E. L. Rivers, James Island, S. C., who in 1899 saved the seed of a single plant which had survived the disease, while all surrounding plants had been killed. This seed Mr. Rivers planted in a single row in a badly infected area. The result is shown in the accompanying illustration. In the resistant row not a

FIG. 6.—Row of Rivers Sea Island cotton in wilt-infected field, planted with rows of ordinary Sea Island cotton.

single plant died, while the adjoining rows planted with ordinary seed were almost totally destroyed.

Sufficient seed was obtained from this row to plant an acre the next year (1901). This land was also infected with the cotton wilt, but only two or three plants became affected, showing the great resistance of the new variety. In 1902, 15 acres were planted. This land was badly infected with wilt and previous crops had been nearly destroyed in portions of the field, so that the land had been abandoned for cotton. The Rivers cotton proved as resistant here as in the previous years. An occasional plant became diseased and was pulled up, but the field as a whole was perfectly healthy and produced a large crop.

These three successful trials of this variety, corroborated by numerous experiments carried on by the Department of Agriculture with

both Sea Island and Upland cotton and by the experience of several cotton planters, demonstrate that the wilt can be overcome by the use of resistant varieties, and this seed is distributed this year in Georgia and Florida to enable the farmers to test its merits and grow for themselves a stock of seed for future planting.

DESCRIPTION OF COTTON WILT.

The especial feature of this variety is its resistance to the wilt, and since some who receive the seed may not be familiar with that disease, a brief description of it is included here. For more detailed information write to the Department of Agriculture at Washington for Bulletins 17 and 27 of the Division of Vegetable Physiology and Pathology.

The Wilt Disease is also known as "Blight" and "Black-root." It is injurious to Sea Island cotton on the Sea Islands of South Carolina, and in southern Georgia and in Florida, and to Upland cotton over wide areas in several States. It is worst on sandy soils, where it persists year after year. Prominent symptoms are the wilting of the plants, which are dwarfed or killed, the brown discoloration of the inner wood of stem and root, and a tufting of the small rootlets.

The wilt is caused by a parasitic fungus in the soil, which enters the roots and grows upward through the water-carrying vessels of the stems, which it clogs. It is aggravated by continuous cropping in cotton, but can not be remedied by rest or rotation, since the fungus can live in the soil for an indefinite time after it has once obtained a foothold. It is not due to the poverty of the land nor to the use of commercial fertilizers, and can not, so far as known, be cured by adding any fertilizer or other substance to the soil.

CONTROL OF THE WILT.

The only remedy known is the use of resistant varieties. When land is badly affected by wilt and seed of resistant cotton can not be had, some other crop than cotton should be planted.

In all cases, even where the disease does not occur or where a resistant variety is available, a rotation of crops is to be recommended, such as corn with cowpeas or peanuts; second, velvet beans; third, cotton; or, first, corn with cowpeas or peanuts; second, oats followed by cowpeas; third, cotton.

DIRECTIONS FOR PLANTING.

In order to fully test the resistant qualities of the variety, this seed should, if possible, be planted on land where cotton has in previous years suffered badly from wilt (black-root). Do not plant Upland cotton near the Sea Island. Much of the "running out" of the long staple cotton in south Georgia is due to accidental hybridization with

neighboring fields of short staple cotton. Since only a small quantity of seed can be had, unusual care ought to be taken in planting to make the seed go as far as possible. The land should be well fertilized and cared for in order to produce a large crop of seed. The Rivers cotton is resistant to wilt, but not necessarily so to rust and other troubles due to poor soil. To secure the best results, therefore, plant the seed on good soil and use from 400 to 600 pounds per acre of commercial fertilizer or its equivalent in stable manure or compost.

In land of ordinary fertility plant in rows 4 feet apart, with the plants 18 inches apart in the row. In rich soil make the rows 5 feet apart, with 20 to 22 inches between the plants. The Rivers cotton is a low, compact variety, and can be planted closer than the average Georgia Sea Island cotton. To economize seed in planting, drop by hand 3 to 5 seeds in a hill, cover lightly, and thin out to one in a place.

In order to give an exact report at the end of the season, the field where this seed is planted should be measured and the yield determined by actual weighing when the crop is picked.

PICKING.

In picking Sea Island cotton much more care should be taken than is necessary with the Upland cotton. Pick often to avoid injury by the weather. Sun the cotton on a low arbor after picking to dry it, and sort out all trash, yellow, and immature cotton, etc., before ginning, as all these impurities injure the sale of the lint. The high prices obtained for the best grades of Sea Island cotton are due in part to the extreme care taken to remove all trash before marketing.

If your trial of this variety results satisfactorily, save all the seed carefully, as it will be difficult to get more from any source. Gin the cotton separately and clean the gins to avoid mixture with inferior varieties.

CHARACTERS OF THE RIVERS COTTON.

Plant resistant to wilt, vigorous, compact, pyramidal, branching near the base; limbs small, close-jointed, bearing heavily; bolls medium size, 3 to 4 lobed; seed small, black, well covered; lint 28 per cent; staple 2 inches long, cream-white, fully to extra fine. Time of maturing, early.

CONTINUAL SELECTION NECESSARY TO MAINTAIN QUALITY.

The qualities of resistance, bearing, etc., characteristic of this cotton, will be found to be thoroughly fixed in the seed distributed. It can not be expected that they will be maintained indefinitely, however, unless careful annual selection of seed is practiced. Though the variety is highly resistant to wilt, there will be occasional individuals reverting to the original type and becoming attacked by the disease. All such should be weeded out and destroyed.

The following method of selection is recommended for keeping up the quality of the variety:

1. *To obtain seed for the main crop.*—Pull up and destroy all diseased or inferior plants and all hybrid or barren stalks, saving seed only from good plants in the general field.

2. *To secure an improved stock for future planting.*—Select from the general field a few plants of the greatest excellence, marking them with a cloth. Leave these unpicked till the middle of the season, then compare them critically with reference to bearing, length, and quality of staple, resistance to wilt, etc., and *choose from this number a single plant which combines the most desirable qualities.* Save all the seed carefully and plant separate from the main crop the next year, one seed in a hill, to secure as great a yield as possible. This cotton planted by itself each time will give sufficient seed the third year to plant the whole crop. This selection should be carried out every year. The propagation from single plants insures a uniformity that can be secured in no other way.

This is the method practiced in the Sea Islands, and if it were done in Georgia and Florida there would be less trouble with the "running out" of the cotton.

W. A. Orton,
Assistant Pathologist.

Approved:
A. F. Woods,
Pathologist and Physiologist.

REPORT RESULTS.

Special attention is called to the fact that this is a new variety of great value, and that it can not be bought in the market at any price. For this reason farmers receiving this seed should plant it with care and save the seed.

It is desired to know the results of all trials of the Rivers cotton, and every farmer who receives seed is requested to return the accompanying card with his name and address, signifying his willingness to report at the end of the season. Blanks will then be sent out to be filled and returned. The Department wishes to continue the work of originating and distributing wilt-resistant varieties adapted to the requirements of the various cotton-producing sections, and the active cooperation of farmers will be of great assistance.

A. J. Pieters,
Botanist in Charge.

Approved:
B. T. Galloway,
Chief of Bureau.

[Circular sent to recipients of seed of Sea Island Cotton No. 224.]

SEA ISLAND COTTON NO. 224.

U. S. Department of Agriculture,
Bureau of Plant Industry,
Washington, D. C., February 1, 1903.

Dear Sir: We send you herewith one peck of seed of Sea Island cotton "No. 224." This is a selection resistant to the wilt disease. It is distributed for trial under our Department number rather than as a named variety, but if it proves desirable to continue its cultivation, a name will be given to it later.

It was originated by selecting from a field badly affected by wilt two plants that had remained healthy. The seed obtained was planted on wilt-infected land the two years following, where it continued to resist the disease, although adjoining cotton was killed. These two successful trials indicate that its wilt resistance is well fixed, and it only remains to establish in this strain the desired commercial qualities, such as length and fineness of staple, uniformity, and productivity.

"No. 224" was developed from one of the coarser kinds of cotton grown on the Sea Islands, and more attention was paid to securing wilt resistance than fine quality. For this reason it is not equal to the best varieties grown on the Sea Islands, though it is of the grade of cotton for which there is most demand in the market. The price obtained for the crop of 1902 was 24 cents per pound, but the factor informed us that it was marketed "in such a bright and showy condition that it was placed on that account in a higher grade than its staple warranted." These facts are stated plainly in order that the planters who test it may not be disappointed in the results. The Department recommends it for its wilt resistance only, but believes that it is worthy of trial as a basis from which desirable strains can be developed by the methods of selection familiar to Sea Island planters. The fact that this is not a fine cotton should not be taken as an indication that quality need be sacrificed in securing resistance to wilt. Our experience leads us to believe that wilt-resistant strains can be obtained of any degree of fineness desired, depending on the quality of the plant chosen at the beginning of the selection.

The method of selection that we have found to give best results in breeding wilt-resistant varieties is essentially the same as that usually practiced for improvement of quality. It is necessary that the first selections should be made in a field known to be thoroughly infected with the wilt disease, so that every healthly plant can be assumed to be resistant. Select only those plants that show no trace of the wilt disease. Several of these most prominent resistant plants should be marked and examined critically. Eight or ten that have the finest and longest staple and are most productive should be retained, and the seed of each plant kept separate. The next year these lots of seed

should be planted side by side on badly infected land and the progeny compared carefully with especial reference to power shown of transmitting the resistant quality. If the descendants of any plant show many diseased stalks, the whole selection should be discarded. It will be found that in the most resistant strains almost no susceptible plants will appear. Of the resistant strains, only the one having the best commercial qualities need be retained after the second year; but the first year it is well to start with several plants, as some often turn out to be nonresistant.

To insure the maintenance of uniformity and good quality in the resistant variety, the selections should be repeated every year. The evidence we have now shows that the resistance to wilt can be maintained in this way without difficulty. A resistant variety will run out if neglected, just as any other kind would do.

Future distributions of seeds.—The Department of Agriculture is now growing a number of wilt-resistant selections of Sea Island cotton, which it is intended to distribute among the planters as soon as a sufficient quantity is obtained. Some of these may be better than the "No. 224," but in the meantime it is hoped that the planters will continue the work of originating resistant strains for themselves, as so many are now doing.

W. A. Orton,
Assistant Pathologist.

Approved:
A. F. Woods,
Pathologist and Physiologist.

[Circular sent to recipients of seed of the Iron cowpea.]

IRON COWPEA.

(*A variety resistant to wilt and root-knot.*)

HISTORY.

The Iron cowpea is a variety especially adapted for soil renovation and forage purposes on land where other varieties fail to succeed because of the attacks of wilt, root-knot, and other soil parasites. The seed sent out in two-quart packages accompanying this circular is grown expressly for the Department of Agriculture and is distributed in the Southern States primarily to test its resistance to the diseases mentioned above, which cause the condition of land commonly known as "pea-sickness." In localities where no disease occurs it should be tested for hardiness, resistance to drought and weevils, and general value.

The origin of the Iron cowpea is uncertain. It was found in cultivation in Barnwell and Aiken counties, S. C., and its remarkable

resistance to disease was demonstrated by experiments made by the Department of Agriculture in 1900–2 on the farm of Mr. T. S. Williams, Monetta, S. C., where the seed now distributed was grown. It was tested on land infested with both wilt and root-knot in comparison with over forty other varieties, all of which were wholly or partially destroyed by disease, while the Iron variety remained healthy. A photograph of this field is shown in Plate III, fig. 1. The Speckled cowpea on the right was treated in every respect like the Iron, but was unable to withstand the disease. In all our trials in South Carolina the Iron cowpea has remained free from nematode attacks, but at the Florida Experiment Station it was somewhat affected. It should be understood that under varying conditions different results may be expected, and this variety may not everywhere prove as resistant as in South Carolina. One object of this distribution of the Iron cowpea is to determine its resistance to disease under varying climatic and soil conditions and its suitability for different sections.

CHARACTERS OF THE IRON COWPEA.

The Iron cowpea is of the Clay type. The seeds are small and hard; color buff, of varying shades. The plant is vigorous, erect, or half-trailing; the leaves dark green, with a distinctive bluish luster; time of maturing, medium to late. It blooms and bears continuously through the season, but the pods do not shell out in the field as freely as other sorts. An especially noteworthy feature is that it holds its leaves late in the season, remaining green after other late kinds are dead. It resists the attacks of the wilt fungus and nematode worm, withstands drought well, and the hard seeds are very free from weevil attacks. The seeds will live through the winter in the ground and come up in the spring more freely than any other variety tested. It is reported to be of fair quality as a table pea.

The Iron cowpea will be most valuable for soil improvement and forage where other kinds fail. On healthy soils it is doubtful whether it will replace existing standard varieties, as it is no more productive than many others. Its long bearing season is a fault, making harvesting more difficult.

DIRECTIONS FOR PLANTING.

In order to test the disease-resistant qualities of this cowpea it should be planted on land where the ordinary varieties do not grow well, if any such is available. For the purpose of comparison, a few rows of another variety should be planted beside it. The methods of planting and cultivation should be the same as for the common varieties. To secure a good crop of seed, plant from May 20 to July 10, according to the latitude, in drills 3 to 4 feet apart, at the rate of 2 pecks per acre.

DISEASES OF THE COWPEA.

The Iron cowpea is most noteworthy for its resistance to the cowpea wilt disease and root-knot. A full description of these diseases, with accounts of experiments with remedies, etc., is published in Bulletin No. 17, Bureau of Plant Industry, United States Department of Agriculture, and will be sent free on request. A brief account is given here to enable the farmer to recognize these troubles.

THE COWPEA WILT.

The wilt of the cowpea is common only on light or sandy soils, and occurs principally on land where cowpeas have been grown for several years. It appears about August in spots of varying size, which spread gradually over the field. The plants in these areas turn yellow, lose their leaves, and die. The stems have a reddish-brown tinge, and, when broken, the inside will also be found discolored. Later, these stems become covered with the light-pink spores of the fungus which causes the disease. This fungus enters the roots from the soil and, growing upward, fills the water-carrying vessels of the stem with its threads, thus shutting off the water supply and causing the death of the plant.

Remedies.—The cultivation of the Iron pea is the best means of relief, as it will grow where all other kinds fail. Rotation of crops for two years will give temporary relief, or since the disease does not attack any other crop than the cowpea, velvet beans or other legumes may be substituted.

ROOT-KNOT.

Root-knot, like the wilt, is most injurious on sandy soil, and the two diseases are often found occurring together. It is caused by a minute nematode, or eelworm, which enters the roots and produces large, irregular swellings or galls. These very injurious enlargements should not be confused with the bacterial tubercles found on all healthy cowpea roots. The latter are small and regular in form and greatly benefit the plant by enabling it to draw nitrogen from the air. The accompanying figures illustrate this distinction. A few bacterial tubercles appear on the healthy roots in Pl. III, fig. 2, while the roots in fig. 3 are deformed by root-knot.

Root-knot is also produced on several other plants by the same nematode that attacks cowpeas. Cotton, okra, peaches, and most garden vegetables are greatly injured by it. This is the most serious feature of the disease, since the cultivation of the ordinary varieties of cowpea on nematode-infected land so greatly increases the number of the parasites in the soil that succeeding cotton or other crops are much injured.

Remedies.—It is hoped that work now in progress in the Department of Agriculture will result in the breeding of varieties of cotton, peaches, etc., which will be resistant to root-knot. At present no remedy is known that will entirely free land in our Southern States from this disease. The sterilization of the soil by heat or toxic chemicals, clean fallowing, etc., have been recommended, but the best that can be done in ordinary farm practice is to adopt a rotation designed to starve out the parasites by growing a succession of immune crops, such as the Iron cowpea, beggarweed, corn, oats, or other grains, grasses, etc. A rotation like the following is suggested for cotton planters: First year, corn, with Iron cowpeas between the rows; second year, either beggarweed, velvet beans, or oats, followed by Iron cowpeas; third year, cotton. If necessary cotton might also be planted the fourth year, after which the rotation should be repeated.

W. A. Orton,
Assistant Pathologist.

Approved:
A. F. Woods,
Pathologist and Physiologist.

REPORT RESULTS.

It is desired to know the results of all trials of the Iron cowpea, and every farmer who receives seed is requested to return the accompanying card with his name and address, signifying his willingness to report at the end of the season. Blanks will then be sent out to be filled and returned. A report will be asked for on the character of soil, whether or not infested with wilt or nematodes, manner of planting, character of season, success as a forage crop, yield as compared with other varieties, resistance to disease, etc.

A. J. Pieters,
Botanist in Charge.

Approved:
B. T. Galloway,
Chief of Bureau.

[Circular sent to recipients of seed of Kleinwanzleben sugar beet.]

KLEINWANZLEBEN SUGAR BEET.

Grown by E. H. Morrison, at Fairfield, Wash., from mother beets of exceptionally high sugar content and purity. The Department of Agriculture wishes to have written reports as to the quality of this seed, as sugar beet seed raising in the United States is a new industry. All requests for either beet or vegetable seed for another year from those sending such reports will be given special consideration.

FIG. 1.—FIELD INFECTED BY WILT AND ROOT-KNOT.

Iron cowpea, resistant; Speckled cowpea, killed.

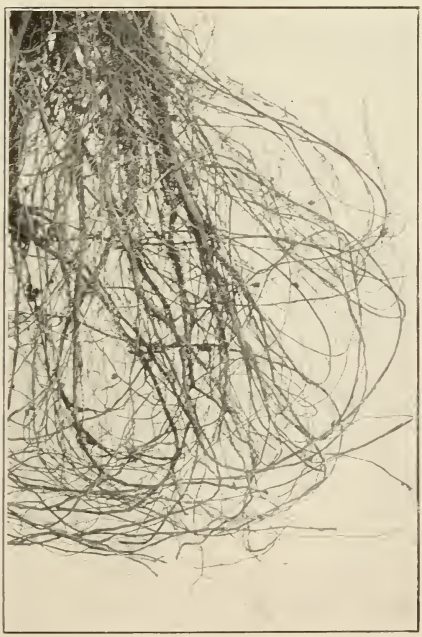


FIG. 2.—ROOTS OF IRON COWPEA.

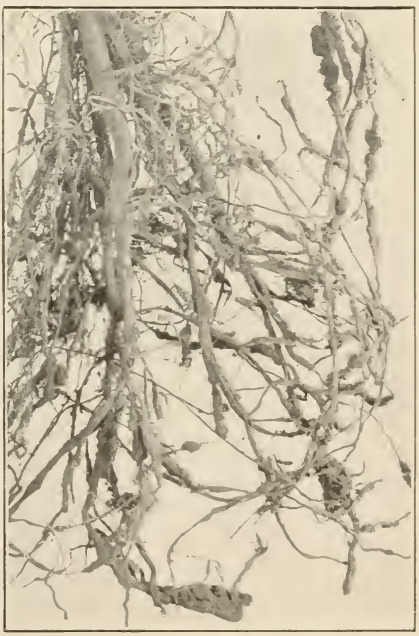


FIG. 3.—ROOT-KNOT ON WONDERFUL COWPEA.

From adjoining rows in the same field.

Culture.—While sugar beets can be successsully grown on a variety of soils, it is usually considered that they thrive best on a rich, sandy loam, having uniform surface and subsoil. The soil should be deep, with moderately porous subsoil, and either naturally or artificially drained. A good crop can not be grown on shallow soil having a hard, impenetrable or water-soaked subsoil. A soil that will grow a good crop of corn or potatoes is well adapted for beet culture. Well-rotted manure, phosphates, and potash may be freely used, but Chile saltpeter, if used at all, should be used sparingly. The proper preparation of the soil is a prerequisite to successful growing. The ground should be fall plowed to a depth of 9 or 10 inches, and subsoiled 5 or 6 inches more. The surface should be thoroughly pulverized by disking and harrowing as soon as the frost is out of the ground. After the weeds have a good start, the ground should be again harrowed to destroy them, and finally harrowed the day before seeding. The seed should be evenly planted in rows 18 inches apart, as early in the spring as the season will permit. If a drill is used, 15 to 20 pounds of seed are required to sow one acre, while 10 to 15 pounds are sufficient if sown by hand. Cover the seed to a depth of one-half to 1½ inches, according to the condition of the soil and the season. To keep weeds from getting a foothold and the surface loose, cultivation should begin as soon as the seeds have sprouted sufficiently to show the rows and continued as long as it is possible to do so without breaking the lower leaves. Thinning should be done as soon as the plants have four well-formed leaves. This can be most easily done by bunching with a 6-inch hoe, leaving a group of plants every 6 to 10 inches. Thin to one plant to each group, using care always to leave the strongest and healthiest plant, even though the plants are at somewhat irregular distances. Give a thorough hoeing at the time of thinning.

It is difficult to give general directions for raising sugar beets, as local conditions of soil and climate often make general rules impracticable, when the individual grower must meet conditions peculiar to his particular locality.—J. E. W. Tracy.

Attention is again called to the desirability of a report on this seed. The beets raised from this seed should be hauled to the factory in a separate load from beets grown from any other seed, and a separate test for sugar content and purity should be made. If persons receiving this seed will send to the undersigned a postal card stating that they are willing to fill out a report, a blank form will be forwarded to them.

A. J. Pieters,
Seed and Plant Introduction and Distribution.

[Circular sent to recipients of tobacco seed.]

PLAN OF DISTRIBUTING TOBACCO SEED, AND CULTURAL DIRECTIONS FOR THE DIFFERENT TYPES OF TOBACCO DISTRIBUTED.

For several years the Bureau of Plant Industry and the Bureau of Soils have been cooperating in work looking toward the improvement of tobacco in this country. Under the direction of the Chief of the Bureau of Soils the tobacco seed for the forthcoming Congressional seed distribution was secured from carefully selected and matured plants, in accordance with directions issued by the Department to individual growers. The seed was obtained from the best localities for each variety, and a plan of distribution worked out whereby the varieties suitable for certain districts will be sent there.

The following directions for the distribution and culture of the different types of tobacco have been prepared in the office of the Chief of the Bureau of Soils:

PLAN OF DISTRIBUTING TOBACCO SEED.

The Congressional districts in which tobacco seed will be distributed and the varieties which it is believed are best adapted to these districts are as follows:

ALABAMA:

First district: Florida Sumatra, Florida Cuban, Connecticut Havana.

ARKANSAS:

Second, Fifth, and Sixth districts: Kentucky White Burley, Virginia Oronoco, Virginia White Stem.

CALIFORNIA:

Sixth and Seventh districts: Florida Sumatra, Florida Cuban, Connecticut Havana.

CONNECTICUT:

First, Second, and Fourth districts: Florida Sumatra.

FLORIDA:

First and Second districts: Florida Sumatra, Florida Cuban.

GEORGIA:

Second district: Florida Sumatra, Florida Cuban.

ILLINOIS:

Ninth district: Ohio Zimmer Spanish, Connecticut Havana.

Nineteenth, Twentieth, and Twenty-second districts: Tennessee Improved Yellow Mammoth, Tennessee Oronoco.

INDIANA:

First, Third, and Fourth districts: Tennessee Oronoco, Kentucky White Burley, Tennessee Improved Yellow Mammoth.

KENTUCKY:

First, Second, and Third districts: Tennessee Improved Yellow Mammoth, Tennessee Oronoco.

Fourth and Fifth districts: Tennessee Improved Yellow Mammoth, Tennessee Oronoco, Kentucky White Burley.

Sixth, Seventh, and Ninth districts: Kentucky White Burley.

Eighth, Tenth, and Eleventh districts: Tennessee Oronoco, Kentucky White Burley.

LOUISIANA:

Second and Third districts: Kentucky White Burley, Tennessee Improved Yellow Mammoth, Florida Cuban.

MARYLAND:

Second and Sixth districts: Ohio Zimmer Spanish, Connecticut Havana.

Fifth district: Maryland Smoking.

MASSACHUSETTS:

First and Second districts: Florida Sumatra.

MISSOURI:

First, Second, Seventh, Eighth, Ninth, Thirteenth, Fourteenth, and Fifteenth districts: Tennessee Improved Yellow Mammoth, Tennessee Oronoco, Kentucky White Burley.

NEW YORK:

Twenty-fourth, Twenty-seventh, Twenty-eighth, and Twenty-ninth districts: Florida Sumatra, Florida Cuban, Connecticut Havana, Ohio Zimmer Spanish.

NORTH CAROLINA:

Second, Fourth, Fifth, Seventh, Eighth, and Ninth districts: Virginia Oronoco, Virginia Sun Cured, Virginia Blue Pryor, North Carolina Bright Yellow.

OHIO:

First, Third, Fourth, and Seventh districts: Ohio Zimmer Spanish, Connecticut Havana, Florida Cuban.

Sixth district: Ohio Zimmer Spanish, Florida Cuban, Kentucky White Burley.

Tenth district: Ohio Zimmer Spanish, Connecticut Havana, Kentucky White Burley.

Fifteenth, Sixteenth, and Seventeenth districts: Maryland Smoking, Ohio Zimmer Spanish.

Twentieth district: Maryland Smoking, Ohio Zimmer Spanish, Florida Cuban.

PENNSYLVANIA:

Sixth, Seventh, Ninth, Tenth, Fourteenth, Fifteenth, Sixteenth, Seventeenth, and Nineteenth districts: Ohio Zimmer Spanish, Connecticut Havana, Florida Cuban.

SOUTH CAROLINA:

First, Second, Third, Fourth, Fifth, Sixth, and Seventh districts: Virginia Oronoco, Virginia White Stem, Virginia Blue Pryor, North Carolina Bright Yellow.

TENNESSEE:

First, Second, and Third districts: Tennessee Improved Yellow Mammoth, Tennessee Oronoco, North Carolina Bright Yellow.

Fourth district: Tennessee Improved Yellow Mammoth, Kentucky White Burley.

Sixth district: Tennessee Improved Yellow Mammoth, Tennessee Oronoco, Kentucky White Burley.

Fifth, Seventh, Eighth, Ninth, and Tenth districts: Tennessee Improved Yellow Mammoth, Tennessee Oronoco.

TEXAS:

First, Second, Ninth, and Tenth districts: Florida Sumatra, Florida Cuban, Ohio Zimmer Spanish.

VIRGINIA:

First, Third, Fifth, Seventh, Eighth, and Ninth districts: Virginia Oronoco, Virginia Sun Cured, Virginia Blue Pryor, North Carolina Bright Yellow.

Fourth, Sixth, and Tenth districts: Virginia White Stem, Virginia Sun Cured, Virginia Blue Pryor, North Carolina Bright Yellow.

West Virginia:

Third district: Virginia Oronoco, Virginia Sun Cured, North Carolina Bright Yellow, Kentucky White Burley.

Fourth district: Virginia White Stem, Virginia Sun Cured, North Carolina Bright Yellow, Kentucky White Burley.

Wisconsin:

First, Second, Third, Seventh, and Tenth districts: Florida Sumatra, Florida Cuban, Ohio Zimmer Spanish, Connecticut Havana.

CULTURAL DIRECTIONS FOR THE DIFFERENT TYPES OF TOBACCO.

Florida Sumatra Tobacco (Northern Districts).

A very rich spot should be selected for the seed bed of Sumatra tobacco grown in the North. In the early fall this plot should be plowed and divided into beds 6 feet wide and any desirable length, surrounded by a wall made of boards, 2 inches thick and 12 inches wide, set 2 or 3 inches in the ground. These beds should be highly fertilized with cotton-seed meal and stable manure, well spaded in to a depth of 6 or 8 inches, and the whole covered with leaves, manure, or trash to keep out the frost during the winter. About April 1 this top dressing should be taken off and the bed again spaded and the soil well pulverized, after which another application of cotton-seed meal or cotton-hull ash should be given. This should be raked in and the surface made smooth and loose, making the bed ready to receive the seed. About five days before the time of sowing the seed should be put to sprout in apple-tree punk, made soft with warm water. This should be put in a fruit jar and kept in a warm room. It will be observed that the seed will be slower in sprouting than domestic tobacco seed, and it will not sprout uniformly; that is, all the seed will not sprout at the same time. It is best to wait until nearly all the seed is sprouted before sowing. Mix the seed with bran or cotton-seed meal and sow at the rate of 2 tablespoonfuls of the seed to 100 square yards, after which a heavy roller should be drawn over the bed, thus packing the seed well into the soil, making the surface smooth and preventing the rapid drying out of the soil which would otherwise take place. If the ground is dry, it should be watered immediately after sowing the seed, and this should be continued from time to time as the soil may require. In the absence of rain after the plants are up watering should still be practiced.

There are many enemies of the seed bed in the way of insects, so a careful watch is necessary. As soon as there is any appearance of flea-beetles or horn worms, the bed should be sprayed with paris green mixed with water at the rate of 1 tablespoonful to 2 gallons of water. In order to keep down the insects, the bed should be sprayed at least three times a week. It is safer to protect these early beds with canvas stretched on frames made over and around the beds.

When the plants are drawn for transplanting, great care should be taken to get as much root as possible. Each person doing this work should be provided with a bucket of water, and as soon as the plants are drawn the roots should be washed to remove all soil that may have stuck to them. The plants are then placed in a basket, roots down, and are immediately set out. The washing of the roots is not generally practiced, but it has been found that plants live and grow better when the roots are clean. After each drawing of the plants from the bed, the soil should be watered, in order to close up the places from which the plants have been taken.

The soil selected for this tobacco should be a light gray sandy loam or sand with a sand or clay subsoil, provided the clay is not closer to the surface than 12 or 15 inches. In order to produce a light, thin wrapper, the sandy soil must be very rich and a large quantity of fertilizer is necessary. The land should be broken up in November or December, allowing the plow to cut from 4 to 6 inches deep, according to the nature of the soil and the quantity of fertilizer used. If a large quantity of fertilizer is used, such as cotton-seed meal and stable or barn manure, it should be thrown broadcast over the field and plowed in. This should be done about six weeks before the time of setting out the plants. Often a second application of fertilizer will be needed in order to give a continuous, rapid growth.

The distance between the rows should be 4 feet and between the plants 12 inches. As it is always desirable to get a uniform growth, great care should be exercised to have each plant live. If the ground is moist and showers frequent, watering the plants is unnecessary; but if the ground is dry, they should be watered immediately after setting and, if possible, each day thereafter as long as the plants may require it. After setting the plants they should not be disturbed for at least six days. If the soil becomes packed and hard, a furrow should be run on each side of the row, using a small straight plow and letting it well down. This should be followed immediately by two sweep furrows, which will put the plants on a smooth ridge. The hoe is then used, carefully stirring the soil about the plants. Thereafter cultivation should be frequent and shallow.

As the principal value of Sumatra is its wrapping leaves, great care should be exercised to preserve the soundness of the leaf. In topping the Sumatra tobacco only the bud should be taken out, and all the leaves allowed to grow. If the land is exceedingly rich it is found best not to top at all, but to allow the plant to go to bloom. It has been found by experience that Sumatra tobacco should be harvested at an early stage of ripeness, as the leaf will cure riper and be more elastic—that is, it will have more life. It is usual to take 4 or 6 leaves at each priming, thus going over the field four or five times before the whole crop is harvested.

As soon as the first leaves at the bottom of the stalk begin to ripen, harvesting is begun by plucking off or priming the first four leaves at the bottom and transporting them to the curing shed in baskets. There they are strung on strings attached to laths, from 30 to 40 leaves being allowed to a lath. The leaves are placed back to back and face to face, so as to prevent cupping or folding over each other. The laths are then hung in tiers in the barn, where they remain until the leaves are cured.

When the tobacco is primed from the stalk, it should not take more than two weeks to cure; when it is hung on the stalks, three to four weeks are necessary. The manipulation of the barn or curing shed is governed entirely by the condition of the weather and the nature of the tobacco; so no fixed rules can be given. However, in a general way, it can be said that if a barn is filled with green tobacco and the weather is hot and dry, the ventilators should be tightly closed for about three days, by which time the tobacco should be quite yellow. The barn should then be opened at night and kept closed during the day. This is done to prevent rapid curing, which destroys the life of the leaf and gives uneven colors. If there are frequent showers and but little sunshine, the barn should be kept closed and fires started in small charcoal heaters distributed throughout the barn. These fires should be continued as long as it is necessary to keep the tobacco in proper condition. Where charcoal heaters are not available, wood which has as little odor and as little smoke as possible should be used. It is very important to dry out the barn without giving the tobacco any foreign odors. To obtain the best results the tobacco should become fairly moist and fairly dried out once in every twenty-four hours.

When the midribs are thoroughly cured the leaves are ready to be taken to the packing house. To get the tobacco in condition to handle, all the ventilators should be left open for one night, opening them about 6 o'clock in the evening. The next morning the tobacco should be in what is called "good case;" that is, it will have taken up sufficient moisture to become soft and pliable. The barn is then tightly closed, in order to retain the moisture, and the leaves are taken from the laths. The bottom, middle, and top leaves should be kept separate in the barn. After the tobacco has been taken down and packed it should be taken at once to the warehouse for fermentation and baling.

Florida Sumatra Tobacco (Southern Districts).

The land for the seed bed should be preferably fresh, rich hammock, having a light gray soil, moist but not wet. Dry, thirsty land should be avoided. In selecting the seed bed it is best to secure land sloping from north to south, protected on the north by forests and open on the south to let in the midday sun. The time for sowing the

seed is from March 1 to April 15. Plants should be ready for transplanting about sixty days after sowing.

One week before sowing the seed the bed should be thoroughly cleaned and all straw and leaves carefully raked off, after which the ground should be burned. This is done to destroy all grass and weed seeds or roots which might otherwise come up and choke the tobacco plants. The burning is done in the following manner:

After raking the surface well, skids are laid 4 feet apart, running the full length of the plat to be sown. A pile of wood is then laid across the skids, running the width of the bed. The fire is started, and as fast as the ground is thoroughly burned and covered with ashes the fire and wood are drawn along the skids, wood being continuously added. After the entire bed is burned the ground is again raked to remove the coals, letting the ashes remain. The soil is then spaded to a depth of 4 inches, all the roots and tufts being carefully taken out. If the soil needs fertilizing after the spading is completed (the seed bed should be very rich in order to give thrifty, healthy plants), such quantity of fertilizer as may be necessary is thrown broadcast over the surface. Any complete guano may be used. The bed is again raked with an iron-toothed rake to mix the fertilizer well with the soil and to have the surface smooth and loose.

The bed should be divided into "lands" about 4 feet wide, leaving narrow walks between. Each land should be measured to ascertain how many square feet it contains, and enough seed should be mixed with ashes to sow one land at a time, at the rate of 2 tablespoonfuls of the seeds to 100 square yards. This is the usual allowance for 1 acre to be planted. After the sowing is completed the bed should be rolled with a heavy roller. If the ground is dry it should be watered immediately after the sowing of the seed, and this should be continued from time to time as the soil may require. In the absence of rain, after the plants are up, watering should still be practiced.

The manner of transplanting, the kind of soil to be selected, the methods of field culture, and the manipulation of harvesting and curing are the same in both northern and southern districts.

Florida Cuban Tobacco.

The seed bed for this variety of tobacco should be the same as that for the Sumatra in the South, and should be cleared, burned, and prepared in the same manner. The time for sowing the seed is from January 15 to March 1, and sometimes as late as April. January and February sowings should give plants large enough for transplanting within sixty or seventy days; those of March and April within forty to sixty days. Transplanting is done in the same way as with the Sumatra, except that the plants are set 14 inches apart. The same rules as to watering and early cultivation apply.

When the plants begin to button, cultivation should stop. Early or low topping is not desirable, as it throws too much growth into the leaves, making them large and coarse. There should be from 14 to 16 leaves to the stalk after the plant is topped. At this point suckers will start at each leaf, but these must be broken off at least twice a week. The battle with the worms, which was begun in the seed bed, does not end until the tobacco is harvested. A careful watch should be maintained to keep all insects off the tobacco.

This variety should be harvested and hung in the curing shed in the same manner as the Sumatra. If it gives promise of being "wrapper"—that is, if it is light green, very sound in leaf, and of desirable size—it should be primed at an early stage of ripeness. If, however, appearances prove that it will be "filler" tobacco, it should be allowed to get thoroughly ripe.

If the soil is rich and the season propitious, a second profitable crop can be produced from the suckers in Southern localities. As soon as the original crop is topped suckers will sprout from each leaf. These, of course, should be broken off as soon as they appear, otherwise they will check the growth of the leaf. When all the leaves have been primed from the original stock, except the four or six leaves at the top, two suckers should be allowed to grow from the bottom of the stalk. These two suckers will be well started by the time the top leaves of the original stalk are ripe. The stalk should then be cut just above where the suckers sprout, and cultivation should begin at once, the soil being brought up around the old stubble. The suckers should not be allowed to have more than six leaves each. The growth of these will be rapid and they will mature quickly. When ripe the leaves should not be primed, but the stalk should be cut. It is often the case, where the seasons are favorable, that the suckers will make a very fine quality for filler purposes.

The same method of curing is used for both Cuban and Sumatra tobacco.

Connecticut Havana Tobacco.

The seed bed for this type should be prepared by plowing it in the fall and sowing on a good supply of cotton-seed meal or some other good fertilizer. In the spring, as soon as the frost is out of the ground, the bed should be again plowed or harrowed with a cutaway harrow and a small quantity of phosphate thrown broadcast upon it. The bed should again be harrowed and well raked. The seed should be sown about the middle of April. It is first sprouted by being put in apple-tree punk or moist sand and kept in a warm room. Plants should be ready for setting in the field within six or seven weeks from sowing. The rows should be 3 feet 4 inches apart, and the distance between the plants from 16 to 18 inches. The tobacco is topped so as

to allow from 16 to 18 leaves to the stalk. The average yield per acre is from 1,800 to 2,000 pounds.

The crop is harvested by cutting the stalks and letting them remain in the field until they wilt. Then they are hauled to the barn, where they are speared on laths, from 8 to 12 stalks being allowed to a lath. These are hung up in the barn 8 inches apart.

This tobacco is cured as follows: While the leaves are green the barn should be closed at night and during damp weather and opened during the day; but when the tobacco is half cured, the ventilation should be reversed and the barn closed during the day and opened at night and in damp weather. The tobacco should be fairly dried out and fairly moistened once every twenty-four hours. The curing is completed when the midribs of the leaves are thoroughly dried.

The soil best adapted to the Connecticut Havana variety is a light sandy loam.

Ohio Zimmer Spanish Tobacco.

The seed bed for this type, which is prepared in essentially the same way as that for the Connecticut Havana, should be sown from March 1 to April 15, and the plants ought to be ready for transplanting within eight or ten weeks. The rows in the field should be 3 feet apart and the plants 22 inches from each other in the drill. The tobacco should be topped when the seed bud appears, leaving about 16 leaves to the plant. The average yield is 1,000 pounds per acre.

The Zimmer Spanish tobacco is harvested and cured in the manner described for the Connecticut Havana leaf.

The soil best adapted to the Zimmer Spanish variety is sugar-tree red uplands or "Miami clay loam" of the Soil Survey.

North Carolina Bright Yellow Tobacco.

The seed bed for this tobacco should, if possible, be selected on a hillside sloping from west to east or from north to south, so as to get all the morning sun and be sheltered from the cold west and north winds. The soil of the seed bed should be as rich alluvial virgin soil as can be had. The bed should be well burned and all the grubs taken out. A little 2-inch bull-tongue plow should be used to break up the soil in two ways so as to tear out all the roots, which should be raked out and the bed made smooth. To 100 square yards put on 100 pounds of high-grade fertilizer and 2 barrels of well-rotted stable manure about 1 inch deep. Plow this in with the same bull-tongue plow and rake the bed carefully until the surface is level. After the sowing is completed a heavy roller should be drawn over the bed.

The seed should be sown from the first to the middle of January and not later than the first of February. This will give plants ready for transplanting by April 5. Harvesting should begin from sixty to

seventy days after transplanting. The rows should be 3½ feet and the plants 2½ feet apart. The average yield is 1,000 pounds per acre.

Harvesting may be done by priming the leaves or by cutting the entire stalk. In priming the tobacco the leaves are stripped from the stalk in the field as they ripen, and are strung on strings attached to laths, about 30 leaves being allowed to each lath. These are then hung in the barn to cure. If this method is practiced, from 14 to 16 leaves may be matured on each plant. If it is desired to cure the tobacco on the stalk, the first four bottom leaves should be stripped off and the tobacco topped, so as to leave from 10 to 12 leaves on the stalk. In cutting the tobacco the stalk should be split from the top down to within a few inches from the last set of leaves, and then the stalk should be cut just below these leaves. The plants are hung on the lath by opening the split, 6 to 8 plants being allowed to each lath. These are carried to the barn, where they are hung in tiers.

This tobacco is cured as follows: The barn should be heated to 100° and allowed to remain at that temperature until the tobacco colors well. The temperature should then be gradually raised to 110° and retained until the desired colors are obtained. At 120° the tips of the leaves on the first tier should show signs of drying, and at 125° all the leaves on the first and second tiers should be dry. At this point the barn should be gradually heated to 145°, a pause of several hours being made at 140°. By this time all the leaves in the barn should be dry, but in order to kill the stem the temperature should be raised 5°. Then a rapid rise should be made until 175° is reached, at which temperature the tobacco should be thoroughly cured.

The soil best adapted to this type of tobacco is a light-gray sandy loam.

Maryland Smoking Tobacco.

Prepare the seed bed for this variety as for Cuban tobacco, sowing the seed from February 1 to March 20. The other operations in the production of the two types are the same up to transplanting. The Maryland smoking tobacco is transplanted from May 15 to June 1, in rows 3 feet apart, the plants being given a distance of 20 to 24 inches from each other in the drill. The plants should be topped so as to leave about 16 leaves to the stalk. The average yield is 1,000 pounds to the acre.

In harvesting this tobacco, the plants are cut and four rows are thrown together. They are then speared on sticks, from 6 to 8 plants being allowed to the stick. Care should be taken that the plants are not crowded too closely on the sticks or in the barn. The sticks are hung about 8 inches apart in the barn, and after the tobacco is half cured they can be put closer together if necessary, say about 4 inches apart. It generally takes about two months to cure this tobacco sufficiently to strip.

Tennessee Types (Yellow Pryor, Oronoco, Improved Yellow Mammoth).

The soil best suited for the seed beds of these types is rich, friable, black virgin loam or sandy soil with a southern exposure. The time for sowing the seed is from March 1 to April 15. The preparation and management of the seed bed are the same as for Cuban tobacco. The plants should be ready for transplanting about May 10. The rows in the field should be placed 3½ feet apart each way. Ten days are necessary for the plants to establish themselves in the soil, and at the end of that time cultivation with the plow should begin; afterwards the hoe should be used. The field should be worked first one way and then the other.

About six or eight weeks after transplanting the plants ought to be ready for topping. This is done by pinching off the bud, leaving 8 or 10 leaves to the stalk, not including the leaves at a distance of 6 inches from the ground. All suckers should be kept off the plant.

The tobacco should be allowed to get thoroughly ripe before harvesting, which is done in the following manner: Split the stalk down from the top to within a few inches of the last set of leaves. Cut two rows, laying the plants right and left, and when wilted hang the plants on laths, from 8 to 12 stalks to a lath. These should be laid in small piles at a sufficient distance apart to allow between them the passage of a wagon, on which the laths are loaded and carried to the curing shed. Care should be taken not to cut the plants after a rain or in the hot sun.

This tobacco is cured as follows: After it has been hanging in the barn four or five days, slow fires should be kindled under it, and at the expiration of twenty-four hours the heat should be gradually increased until 150° is reached. The leafy part and one-half the stem should be cured in three days and nights. After this the tobacco should be allowed to come in "order" (soft and pliable) and be dried out by fires. This alternation of getting the tobacco moist and drying it out should be kept up for three or four weeks. This tobacco is cured by open wood fires, made by placing two logs side by side and building a fire between them. Open-fire heat is preferred for all tobacco to be sent abroad.

The soil best adapted to these types is a strong, rich loam with a deep reddish subsoil.

Kentucky White Burley Tobacco.

The seed bed for this variety of tobacco is selected and prepared as in the case of the Cuban type, the only variation being in the time of seeding, which for the Burley is limited to February.

As soon as the plants are well rooted cultivation should begin, and

this should be continued during the growing season, so as not to allow the soil to become crusty and hard. The plants should not be permitted to bloom, but should be topped as soon as the button appears, leaving from 14 to 16 leaves to the stalk.

The tobacco should be allowed to become thoroughly ripe before harvesting. It is harvested in much the same way as the Yellow Pryor and other Tennessee types, but no fire is used in its curing, which is accomplished by simply hanging in the barn.

Virginia Types (White Stem or One Sucker, Oronoco, Sun-Cured, Blue Pryor).

The situation and kind of soil best suited for the seed bed and the methods of its preparation and management are the same for all these types as for the Cuban tobacco, but there are some differences in the time of sowing the seed and in the manner of cultivating, harvesting, and curing the different varieties.

White stem or one-sucker tobacco.—Seed should be planted from January to March. Plants should be set in the field in rows 4 feet apart and given a distance of 3 feet in the drill. The plants should be topped, so as to allow from 8 to 12 leaves to the stalk. The average yield is 1,500 pounds per acre.

About fourteen weeks elapse between the time of transplanting and of harvesting, as this tobacco should be thoroughly ripe when cut. The crop is cut and harvested in the following manner: The stalk is split from the top to the last set of leaves and severed about 2 inches below the split, or just below the last set of leaves. Hang the stalks on laths by opening the split, seven or eight plants being sufficient for one lath.

The curing is done as follows: Put the tobacco in the barn as quickly as possible—before it begins to turn yellow. After the barn is filled build a fire of dry oak or other hard wood and make it hot enough to scald the leaves. About five hours of firing at a temperature of from 150° to 155° will usually scald the leaves. Then diminish the heat and keep a slow fire in the barn until the stalks are cured. Forty-eight hours are required to perfect this cure.

The soil adapted to this type of tobacco is a sandy loam with a red clay subsoil. Without such subsoil the tobacco will have a dull, slaty color, while with it the tobacco will be rich, glossy, and much tougher.

Oronoco tobacco.—The time for sowing the seed is from February 1 to April 15. Plants should be ready for transplanting sixty days after sowing if the season is favorable.

In the field the distance between the rows should be 3½ feet and between the plants in the drill 3 feet. The plants should be topped so as to leave from 8 to 10 leaves on the stalk. Fifteen hundred pounds per acre is considered a good crop.

The tobacco is cut in the same way as the White Stem variety. When the plants are wilted, one man walks between the rows, holding the lath on which the plants are to be hung. The hanging is done by two other men, who walk to the right and left of the one carrying the lath. When the laths are full, they are carefully laid on the ground, two or three together. They are then loaded on a wagon and carried to the curing shed, where they are hung in tiers. From 6 to 8 stalks are allowed to a lath.

This type of tobacco is usually cured with a small fire in the barn. Slow fires should be started and kept burning until the leaf is well yellowed; then the temperature should be increased until the leaf is cured and the stalk is brown. After this it is only necessary to have enough fire during the early morning to dry out the leaf until the tobacco is thoroughly cured. From twenty to thirty days are required to complete this curing.

A soil with a stiff clay subsoil is adapted to the growing of this tobacco.

Sun-cured tobacco.—The time of sowing the seed is from February 1 to April 15. Plants should be ready for transplanting in about ninety days after sowing. The rows should be 3 feet 3 inches apart and the plants in the drill 2 feet. The plants are topped so as to leave 10 to 12 leaves to the stalk. The average yield is 1,000 pounds per acre. The crop is cut and harvested in the same manner as the Oronoco type.

Curing is effected as follows: When the tobacco is taken to the curing shed, it is crowded together and allowed to remain until it is quite yellow. Then the barn should be opened or the tobacco should be hung on racks in the sun until cured. Sun and dew are preferred for curing sweet-flavored tobacco. From five to eight weeks are required to effect this cure.

The soil best adapted to this type of tobacco is a medium sandy soil that is high enough to give good natural drainage.

Blue Pryor tobacco.—Seed should be sown from January 1 to March 15. Plants should be set in rows 3½ feet apart and given a distance of 3 feet in the drill. The plants are topped so as to leave 8 or 10 leaves on the stalk. The average yield is from 1,200 to 1,500 pounds per acre. The method of harvesting is the same as for the previous types.

The tobacco is cured in the following manner: It is hung in the barn until it yellows uniformly; then a slow fire is started and continued until the leaf is cured. From three to five weeks are required for the curing of this type.

The soil best adapted to this tobacco is a gray loam with a red clay subsoil.

COMMERCIAL USES OF THE DIFFERENT VARIETIES OF TOBACCO.

Florida Sumatra tobacco is used almost exclusively as a wrapper for domestic cigars. In the southern districts the thick or broken leaves may be cured for filler purposes.

Florida Cuban is essentially a filler tobacco for domestic cigars, although much desirable wrapper is produced from this type in the southern districts.

Connecticut Havana is grown entirely for wrapper and binder purposes for domestic cigars.

Ohio Zimmer Spanish is used exclusively for filler for domestic cigars.

North Carolina Bright Yellow is used for pipe smoking, chewing, and cigarettes. The most valuable leaves are those used for wrappers for plug tobacco and for all-tobacco cigarettes. This type was formerly grown almost wholly for the domestic market, but now a considerable export trade is maintained with England, Japan, and other countries.

Maryland Smoking tobacco was formerly used to a large extent for domestic pipe smoking, but the principal market is in two or three of the "Regie" countries, France taking the bulk of the crop.

The Tennessee types are principally exported.

The Virginia types are used to a very large extent in the domestic markets for smoking and chewing tobaccos and snuff. Considerable quantities, however, are exported, especially the heavier and cheaper grades.

Kentucky White Burley is used for pipe smoking, chewing, and cigarettes. The bulk of the crop is consumed in our domestic markets, but considerable quantities are exported.

RECENT PUBLICATIONS OF THE DEPARTMENT ON TOBACCO.

The following publications are available for general distribution:

Farmers' Bulletin No. 60.—Methods of Curing Tobacco.

Farmers' Bulletin No. 82.—Culture of Tobacco.

Farmers' Bulletin No. 83.—Tobacco Soils.

[Concluded from p. 2 of cover.]

No. 22. Injurious Effects of Premature Pollination; with General Notes on Artificial Pollination and the Setting of Fruit without Pollination. 1902. Price, 10 cents.

No. 23. Berseem: The Great Forage and Soiling Crop of the Nile Valley. 1902. Price, 15 cents.

No. 24. The Manufacture and Preservation of Unfermented Grape Must. 1902. Price, 10 cents.

No. 25. Miscellaneous Papers. I. The Seeds of Rescue Grass and Chess. II. Saragolla Wheat. III. Plant Introduction Notes from South Africa. IV. Congressional Seed and Plant Distribution Circulars, 1902–1903. 1903.

No. 26. Spanish Almonds and Their Introduction into America. 1902. Price, 15 cents.

No. 27. Letters on Agriculture in the West Indies, Spain, and the Orient. [In press.]

No. 28. The Mango in Porto Rico. 1903. Price, 15 cents.

No. 29. The Effect of Black Rot on Turnips: A Series of Photomicrographs, Accompanied by an Explanatory Text. 1903. Price, 15 cents.

No. 30. Budding the Pecan. 1902. Price, 10 cents.

No. 31. Cultivated Forage Crops of the Northwestern States. 1902. Price, 10 cents.

No. 32. A Disease of the White Ash Caused by Polyporus Fraxinophilus. 1903. Price, 10 cents.

No. 33. North American Species of Leptochloa. 1903. Price, 15 cents.

No. 34. Silkworm Food Plants: Cultivation and Propagation. 1903. Price, 15 cents.

No. 35. Recent Foreign Explorations, as Bearing on the Agricultural Development of the Southern States. 1903. Price, 15 cents.

No. 36. The "Bluing" and the "Red Rot" of the Western Yellow Pine, with Special Reference to the Black Hills Forest Reserve. 1903. Price, 30 cents.

No. 37. Formation of the Spores in the Sporangia of Rhizopus Nigricans and of Phycomyces Nitens. 1903. Price, 15 cents.

No. 38. Forage Conditions and Problems in Eastern Washington, Eastern Oregon, Northeastern California, and Northwestern Nevada. 1903. Price, 10 cents.

No. 39. The Propagation of the Easter Lily from Seed. 1903. Price, 10 cents.

No. 40. Cold Storage, with Special Reference to the Pear and Peach. 1903. [In press.]